Field Sampling Plan and Quality Assurance Project Plan for Water Sampling

BreitBurn Oil Island
Seal Beach, CA

July 11, 2002

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APPROVAL PAGE:

SWDIV Lead Remedial Project Manger	**Date**
SWDIV Quality Assurance Officer (QAO)	**Date**
Waterstone Project Manager	**Date** 7/16/02

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Section 1.0
Introduction

On behalf of BreitBurn Energy Corporation, LLC ("BEC"), Waterstone Environmental, Inc. ("Waterstone") submits the following 2nd Draft of the *Field Sampling Plan and Quality Assurance Project Plan for Water Sampling at Site 22, Naval Weapons Station, Seal Beach, CA* ("FSP"). A site location map is provided as Figure 1. This FSP is submitted to replace the *Work Plan for Site 22* dated November 15, 1999 prepared by BEC's prior consultant, Kennedy Jenks Consultants ("K/JC") and its January 13, 2000 Revision 1 submitted to Ms. Patricia Hannon of the Regional Water Quality Control Board (RWQCB). A copy of the K/JC workplan and Revision 1 is provided in Appendix A.

Previously, and for purposes of clarifying the necessary scope of work for Oil Island, Waterstone submitted a summary of work performed to date in a document addressed to Andrew Dick of the Southwest Division of the Naval Facilities Engineering Command (SWDIV) dated July 11, 2000. The purpose of that letter was to establish BEC's understanding of the project and to request comments from reviewers. In it, Waterstone indicated that K/JC November 15, 1999 workplan was to be resubmitted.

During the monthly Project Manager's meetings, agency representatives requested that BEC address prior comments to K/JC November 15, 1999 workplan and that reviewers preferred that BEC resubmit the workplan prior to preparing additional comments. Therefore, this FSP is prepared as a resubmittal of K/JC November 15, 1999 workplan and in accordance with comments provided by the following reviewers:

- Verbal comments from Ms. Patricia Hannon of the RWQCB on January 5, 2000 (acknowledged in a draft document from Kennedy Jenks dated January 13, 2000 provided in Appendix A).
- December 2, 1999 by Mr. Nars Ancog, SWDIV Quality Assurance Officer (QAO) (see Appendix C)
- February 29, 2000 and May 18, 2001 by Ms. Marie T. McCrink of the Geological Services Unit of the DTSC

To facilitate review, copies of comments from SWDIV and DTSC are provided in Appendix B. Although comments are addressed in this workplan, Waterstone also used a table format suggested by Mr. Andrew Dick of SWDIV to reply to these comments. The table format will be provided as a separate letter. This FSP has been prepared taking into account the appropriate responses for comments made as discussed above.

1.1 Objectives

The objectives of the tasks provided in the FSP are to:

- Conduct additional groundwater sampling and analysis to confirm previous groundwater data and determine whether elevated gross alpha and gross beta are manmade or naturally occurring.
- Gather additional data to evaluate whether the bottom of the lagoons is in communication with surrounding tidally influenced surface water.

1.2 Background

Oil Island is located on a man-made island constructed from imported fill material. Oil production has been performed at this location from the 1960's to the present. Oil production activities are projected to continue for a period of decades into the future

Shallow groundwater exists between 5 and 8 feet below ground surface. Lithology is predominantly silty fill material with some sandy silt to approximately 6 feet below ground surface. A previous study by Kennedy Jenks dated August 5, 1998 (*Interim Investigation Site 22)* indicates that fill material is from a quarry located on the Palos Verde peninsula. Groundwater appears to respond to tidal fluctuations, therefore, there is no predominant groundwater flow direction beneath Oil Island.

In 1985, the Naval Energy and Environmental Support Activity (NEESA), now Naval Facilities Engineering Services Center (NFESC), conducted a preliminary assessment (then called an "Initial Assessment Study") for the Naval Weapons Station (NAVWPNSTA) Seal Beach. This report identified 25 sites, including Oil Island, that warranted further investigation. From 1988-1990, Roy F. Weston, under contract to SWDIV, conducted a Site Inspection at Oil Island which collected soil, sediment, and groundwater samples, and recommended the site be further studied under a Remedial Investigation (RI).

The RI report, dated December 1995 with a revision dated November 1997, was prepared by CH2M HILL. The RI report documents and summarizes the results of the RI conducted at several sites within the NAVWPNSTA including Oil Island. The RI report described the results of the investigation performed on Oil Island including analytical results for:

- 16 soil samples collected from 7 boring locations within the lagoon areas of Oil Island,
- 35 soil samples collected from 14 boring locations outside lagoon areas of Oil Island,
- 5 sediment samples collected from 5 locations outside Oil Island
- 5 sediment samples collected from background stratum at Oil Island
- 3 episodes of groundwater sampling from three groundwater monitoring wells installed during the RI.

Sampling results for Oil Island are summarized in the RI on the following tables included in the RI document:

- **Table 7-18**: Concentrations of Inorganic Chemicals of Potential Concern in Soils – Oil Island
- **Table 7-19**: Concentrations of Organic Chemicals of Potential Concern in Soils - Oil Island
- **Table 7-20**: Concentrations of Organic & Inorganic Chemicals of Potential Concern in Sediments – Oil Island
- **Table 7-21**: Concentrations of Organic & Inorganic Chemicals of Potential Concern in Groundwater – Oil Island
- **Table F-4**: Soil Results – Oil Island (A summary of all analytical results for Oil Island).

1.3 Maps

Figure 1 is a map that shows Oil Island's location relative to the surrounding public roads and access. Figure 2 is a plot plan of Oil Island showing the location of lagoons, existing groundwater monitoring wells and other features of the current Oil Island operations

Section 2.0
Field Sampling Plan

Waterstone has developed the following tasks to achieve the stated project objectives in this FSP:

- Task 1.0 - Prefield Activities
- Task 2.0 – Groundwater Monitoring
- Task 3.0 – Study to Determine Pond Infiltration Rates
- Task 4.0 - Report.

Each of these tasks is described in detail below.

2.1 Task 1 - Prefield Activities

Prior to implementation of field work, a number of activities will be performed. These include:

- Prepare a health and safety plan for the site appropriate to the sampling scope of work proposed
- Conduct a job startup meeting to discuss:
  - health and safety issues and personal protective equipment (PPE)
  - field monitoring issues
  - setting up staging area for sampling, decontamination
  - decontamination procedures
  - hospital route and first aid
- Prepare field equipment and schedule subcontractors and Waterstone field staff.

2.2 Task 2 – Groundwater Monitoring

Three groundwater monitoring wells are installed at Oil Island (see Figure 2). Groundwater sampling was last performed on the site in May 1995. It is proposed that additional groundwater monitoring be performed. To achieve representative samples, it will be necessary to re-develop the existing groundwater monitoring wells. Field methods and procedures are discussed below:

2.2.1 Field Methods and Procedures

2.2.1.1 Well Development

Well development procedures are implemented to settle the filter pack and remove fine material which may have migrated from the formation into the well. Development includes the removal of groundwater from the well using standard surging and bailing techniques.

The depth to water and the total depth of the well is measured prior to development with a water sounder to the nearest 0.01 foot. Prior to the removal of groundwater, the volume of water in one casing volume and 10 casing volumes are calculated.

Surging is performed using a clean, hand-held bailer or a bailer or appropriately-sized surge block lowered down the well by a SMEAL 5-T Development Rig or equivalent equipment. The wells are gently surged to force groundwater to flow into and out of the well screen and allow fine-grained sediments to break up, go into suspension, and then migrate into the groundwater standing in the well bore. The wells are then bailed with a clean stainless steel, teflon, or PVC bailer to remove silts and clays which have migrated into the well bore. Turbid groundwater is removed from the well during well development and groundwater representative of the formation collects inside the well.

During development, water pH, electric conductivity (EC), and temperature are monitored at least once for every casing volume removed. If pH, EC, and temperature readings stabilize prior to the removal of 10 casing volumes, less water may be developed from the well. A minimum of 3 and maximum of 10 casing volumes is removed during well development. Development may continue until water temperature, pH and EC have stabilized and the water is visibly clear.

Methods of well development such as disposable, hand-held bailers or pumping devices (i.e. peristaltic, diaphragm, centrifugal, two-stage submersible or hand pumps) may be used depending on the recharge capability of the aquifer. Slowly recharging wells may be developed by removing less than 10 casing volumes from the well.

2 2 1 2 Sample Collection

Groundwater samples will be collected a minimum of 72 hours after well development. Groundwater monitoring will be performed according to the following protocols:

The depth to water and the total depth of the well is measured prior to well purging and sampling with an electronic water interface probe to the nearest 0.01 foot. Prior to the removal of groundwater, the volume of water in one casing volume and 3 casing volumes are calculated.

Purging by Bailing or Pumping

Prior to sampling a minimum of 3 casing volumes are removed from the well using a submersible pump or by hand bailing. During purging, pH, electric conductivity (EC), and temperature are monitored at least once for every casing volume removed. Purging may continue until water temperature, Ph and EC have stabilized (less than 20% variance between readings) and the water is visibly clear.

The procedure for purging a well with a bailer is to lower the bailer slowly into the water until the top of the bailer is submerged just below the water surface. The bailer is withdrawn from the water slowly. This procedure eliminates a plunger effect, which might otherwise stir up accumulated sediments on the well bottom providing groundwater samples that are sediment-

free. Caution is exercised, both during purging and sampling, that the bailer and the bailer rope contacting any part of the well or water within does not touch the ground surface (e g , the bailer rope is coiled by hand or clean visqueen is laid near the wellhead to protect the sampling equipment from contacting the surface). When purging the well using a pump, the pump or intake hose is lowered in a manner so that sediments on the well bottom are not disturbed.

After purging or development, groundwater samples are collected with a disposable polyethylene bailer with stopcock, which is lowered down the well via nylon cord. All equipment (including the nylon cord) is disposed of after use in one well or if it is inadvertantly contaminated during the sampling procedure. Groundwater samples are collected within 2 hours after purging of each well.

Filtered Samples

For metals analysis; a nitric acid preservative (HNO3) is typically required. To prevent leaching of metals from suspended solids, water samples are collected and filtered in the field. A new, disposable filtering device is used at each well location to accomplish this.

Each filtering device consists of a 0.45 micron filter between a double-chambered collection container. The collected water sample is transferred to the top chamber and a vacuum applied to draw the water through the filter. The filtered sample is then transferred from the lower chamber to the laboratory-supplied container with nitric acid preservative for metals analysis. Each filtering device is used only once and disposed of after collection of a sufficient volume of water sample from each well location. To ensure accurate results for the metals analysis, the following specific protocol is performed during sampling for metals:

- All samples for metals analysis are filtered in the field using disposable 0 45 micron filtering apparatus.
- Each sample bottle contains the exact amount of nitric acid necessary for preservative. Because nitric acid from the manufacturer may contain impurities such as various metals, ultra-pure nitric acid is used to ensure that metals concentrations are not introduced into the samples by the acid itself.
- Water samples are transferred, after filtering, into 1-liter polyethylene bottles (with preservative) for metals analysis. Samples bottles are filled in a way to ensure that the acid volume remains consistent for each sample by preventing any water overrun from the sample bottles during sample collection.
- A trip blank is prepared by the laboratory consisting of a sample bottle with the nitric acid preservative and distilled water. This sample is analyzed for metals if metals results for groundwater samples indicate anamalously high metals readings. This blank is a measure of the amount of metals potentially added to the sample as a result of acid contamination or handling of sample bottles during the sampling, packaging, and shipping process.

- A field blank sample is also prepared in the field and analyzed for metals. This is a sample bottle containing nitric acid preservative prepared by the lab. Distilled water is added to the bottle in the field as a measure of potential metals concentrations which are added to groundwater samples as a result of blowing dust, metals concentrations in the air, or other field parameters.

- A rinseate blank sample is prepared in the field and analyzed for metals. This is a sample bottle containing nitric acid preservative prepared by the lab. Distilled water is added to the bottle in the field after circulation through one of the sampling bailers. This sample is analyzed for metals to determine whether metals concentrations have been added to groundwater samples as a result of contamination associated with sampling apparatus.

- One duplicate sample is collected. This duplicate sample is analyzed for metals to ensure reproducibility of data.

The same procedure is used for collecting filtered samples for gross alpha and gross beta analysis.

2.2.1.3 Equipment Decontamination

Pumps and pump power supply, discharge, and safety lines are washed with phosphate-free soap (Alconox (TM)® or equivalent) and potable water and triple rinsed, the last rinse is a distilled water rinse. To minimize contamination of purging and sampling equipment, a plastic sheet is placed on the ground at the base of each well prior to purging and sampling.

2.2.1.4 Sample Containers and Sample Preservation

FGL Laboratories will provide the appropriate sample containers and preservative. One-liter poly bottles are used to collect groundwater samples for gross alpha/gross beta and other radioactive analysis. No preservative is required.

One-liter poly bottles are also used to collect groundwater samples for metals analysis. Samples are filtered prior to collection in sample containers. Nitric acid preservative (measured at the laboratory) is used.

2.2.2 Disposal of Waste Materials

Purged groundwater and decontamination water is transferred to Department of Transportation-approved, 55-gallon drums and temporarily stored onsite pending sample analysis results. After receipt of analytical results, the proper method for disposal of the water is identified. Appropriate disposal of water from groundwater sampling activities will be arranged with Cameron Environmental, Inc. of Torrance, CA.

2.2.3 Sample Documentation

Each sample will be assigned a unique number or identification as follows:

- Well Number
- "F"or "U" for filtered or unfiltered
- "Dupl." for duplicate
- "Trip Blank"
- "Rinse Blank"

This unique number will be used to track the sample from collection, through laboratory analysis and into the final reports. All samples, including duplicate and quality control samples, will be numbered in the same fashion.

2.2 3.1 Sample Labels

All sample bottles will contain a sample label made of waterproof paper. These will be provided by the laboratory and will be printed with the project name, sample number, date and time of collection will be written on the label with ink.

2.2 3.2 Sample Chain-of-Custody

Possession of samples will be traceable from the time of sample collection through check-in at the laboratory. This will be accomplished through the use of a chain-of-custody form provided by the laboratory. All individuals taking possession of samples will sign and date the form. These forms will be sealed in a plastic cover (baggie) and shipped in the appropriate cooler.

For the purpose of these procedures, a sample is considered in custody if it is:

- In one's actual possession.
- In view, after being in physical possession.
- Locked so that no one can tamper with it, after having been in physical custody.
- In a secured area, restricted to authorized personnel.

In general, the following procedures will be followed to trace chain of custody. Deviations will be documented in the appropriate field or laboratory logbook.

- originator completely fills in all requested information, signs and dates the form and seals it in a plastic bag for shipment with the cooler;

- The person receiving custody checks the sample label information against the chain-of-custody form. The receiver notes anything unusual in the Remarks column, then signs and dates the form in the appropriate place;

- In all cases, it must be readily evident that the person receiving custody has relinquished it to the next custodian (except on final arrival at the laboratory).

2.2.4 Sample Packaging And Shipping

This section explains the sample packaging and shipping requirements for the sampling program. All samples for chemical analyses collected during the course of a day will be shipped by express carrier that night for delivery the same day or the next morning. All samples for chemical analyses will be inserted into the correct sample container, labeled appropriately and immediately placed on ice. Appropriate information will be documented on the chain-of-custody form. Prior to shipping to the laboratory, the samples will be cleaned by wiping carefully with a paper towel (if necessary) and repacked in the cooler to comply with all Department of Transportation (DOT) regulations.

Samples will be labeled, shipped and preserved using the following procedures:

A. A sample label previously described will be affixed to each sample container.

B. The field sampler will record all analytical parameters for that sample on the chain-of-custody forms.

C. The containers will be placed in DOT-approved coolers (ice chests) containing packs of frozen gel or ice to maintain a sample temperature of 4°C. Samples will be packed with cushioning material (i.e. bubble wrap or foam) sufficient to prevent breakage of glass sample containers during transport.

D. The paperwork for the laboratory (chain-of-custody, etc) will be placed inside a plastic bag and the bag will be sealed placed inside the cooler.

E. The cooler will be closed and sealed with strapping tape if it is to be transported by overnight courier.

F. The cooler(s) will be delivered by an overnight or same day courier.

2.2.5 Quality Control Samples

One duplicate sample, one trip blank and one equipment rinse blank will be prepared, collected and analyzed according to the requirements of the Quality Assurance Project Plan. The rinse blank and trip blank are submitted for analysis of radiation parameters and metals. The rinse blank is a vial of distilled water that is circulated through the bailer prior to sampling. The trip blank is a vial of distilled water included in the thermally-insulated ice chest during sampling and shipping. These blanks are used to provide an indication of contamination introduced as a consequence of the sampling and shipping procedure. All groundwater samples are labeled, sealed, placed in a thermally insulated chest with ice, and delivered under chain-of-custody to a State-certified hazardous waste testing laboratory.

2.2.6 Groundwater Analysis

Groundwater samples will be collected from each of the three onsite groundwater monitoring wells. A duplicate sample will also be collected from one of the wells (see QAPP for further

discussion). To determined whether gross alpha and beta is naturally occurring or manmade, the following analyses will be performed:

- Gross alpha/beta (EPA Method 900.0 or 0-02)
- Radium-226 (EPA 903.1)
- Radium-228 (EPA 904.0)
- Total Uranium (EPA Method 908.0 or alpha spectroscopy)
- Radon (SM 7500-Rn or equivalent) (only run on unfiltered sample)
- Gamma emmitters (EPA 901.1).

To evalute groundwater samples for metals concentrations, the following analyses will be performed on filtered and unfiltered groundwater samples (for 3 wells, 1 duplicate and 1 rinseate sample [rinseate analyzed on unfiltered sample only] for 9 total):

- Title 22 Metals (EPA Method 6010B) including cadmium, arsenic, copper, lead, nickel, zinc, chromium, and cobalt

General chemistry parameters will also be analyzed on unfiltered samples only including (for 3 wells, 1 duplicate for 4 total):

- Alkalinity (EPA Method 403) including biocarbonate alkalinity, carbonate alkalinity, and total alkalinity as carbonate
- Chloride (EPA Method 310.1/310.2)
- pH (EPA Method 150.1)
- Specific conductivity (EPA Method 120.1)
- Sulfate (EPA Method 300.0)
- Total Dissolved Solids (EPA Method 160.1).

Samples will be analyzed on a 7-day turnaround time basis This data will be compared against data previously collected for these parameters and other available information regarding metals, radioactive compounds and general chemistry parameters to evaluate groundwater at Oil Island

2.3 Task 3 - Determine Pond Infiltration Rates and Potential Communication with Groundwater

The Navy and oversight agencies have requested that an evaluation of seepage and infiltration rates for water contained in the ponds at Oil Island be performed using available information. The potential for water impounded in the lagoons (if any) to seep through the ponds and reach the underlying, tidally-influenced groundwater will be evaluated. To perform the evaluation, the following data will be collected:

- Thickness and hydraulic conductivity of pond bottom material
- Elevation of pond bottom/island fill soil interface
- Range of tidal fluctuations in Oil Island monitoring wells

The timing for data collection is very important. Thickness, hydraulic conductivity, and elevation data must be collected from a dry pond bottom. Thickness data should be collected during the lowest low tide possible. Tidal fluctuation measurements should be collected on a day where the largest tidal fluctuation range can be measured. This is to ensure that the highest high tide can be evaluated for potential communication with pond bottoms.

Based on tidal tables published for the area (via the internet) by the National Oceanographic and Atmospheric Administration (NOAA), the greatest tidal fluctuations for the year occur during the month of December 2002. This is the optimum time to collect thickness, hydraulic conductivity, and elevation data at Oil Island.

During the month of December, high tide ranges from 6.4 to 6.8 feet in height and low tide ranges from -1.0 to -1.4 feet. The optimum day would be December 4th (Wednesday) when a high tide of 6.8 feet at 8:23 am Wednesday morning is followed by a low tide of –1.4 feet at 3:38 pm Wednesday afternoon. The high tide of 6.8 feet is the highest high tide predicted for the year 2002. Low tide of –1.4 feet is also comparable to the lowest low tide of the year (-1.5 feet) that was predicted for January 2002. December 4th is also a good date to provide the driest pond bottom material possible.

Alternate dates would be during the months of August and November. The optimum dates in these months would be August 8 – 9 (Thursday – Friday) and November 5th (Tuesday) when high tides of 6.6 feet are followed by low tides of –1.1 feet. The high tide of 6.6 feet is comparable to the highest high tide of the year (6.8 feet) that is predicted for December 2002. Low tide of –1.1 feet is also comparable to the lowest low tide of the year (-1.5 feet) that was predicted for January 2002.

Waterstone proposes to collect a core of soil in the bottom of the driest pond during lowest low tide from an exploratory boring. The boring will not exceed 3-inches in diameter. Depending on pond accessibility during the sampling time, the boring will be advanced by hand auger or by a truck mounted StrataProbe which is a direct-push sampling tool (see protocols in Appendix D).

The following scope will be performed on the exploratory boring:

- A registered geologist will log the core for lithology, appearance, color, and other characteristics.
- Two representative soil samples will be collected from the core to measure hydraulic conductivity at the laboratory.
- A temporary screen will be placed in the hole to keep the hole open and allow a groundwater level measuring device to be lowered down the hole and measure depth to groundwater.
- The measuring point of the temporary well screen will be surveyed for comparison of groundwater level with the onsite monitoring wells.

At the same time, groundwater monitor wells on Oil Island will be measured to determine the groundwater elevation.

The importance of collecting the pond bottom soil core at low tide is as follows:

- The soil should be less saturated during low tide if underlying groundwater does infiltrate the pond bottom during tidal fluctuations.
- The depth to water can be measured and saturated soil depths can be noted inside the borehole at the time of lowest tide to provide a measurement within the pond for comparison with water levels measured in the wells.
- A lower water level will facilitate the careful backfill of this boring with bentonite chips or bentonite grout to ensure a complete seal.

This information and any information provided by previous RI activities will be used to:

- Evaluate the thickness of pond bottom material and the depth of the pond bottom/fill material interface
- Note the saturation level of soil in the core which may provide information regarding the potential infiltration of water from underlying groundwater on pond bottom material.
- Compare the elevation of groundwater in the wells to groundwater in the exploratory hole.
- Research evapo-transpiration rates for the area to understand the rates of evaporation vs. the potential rates of infiltration in the pond.
- Provide an evaluation with this and other available data to estimate:
    - Whether the pond bottom sediments are in communication with underlying groundwater.
    - Whether rainwater from the ponds passes through the pond bottoms to underlying groundwater.

2.4 Task 4 - Report Preparation

Waterstone will prepare a report summarizing the following project information:

- Project Objectives and Background
- A Summary of the Scope of Work Implemented
- Sampling Methodologies
- Analytical Test Results
- Discussion Of Test Results
- Conclusions.

The report will also contain tables and figures summarizing analytical test data and sampling locations, respectively. Laboratory reports will be provided as an appendix to the report

Section 3.0
Quality Assurance Project Plan

This FSP incorporates the Quality Assurance Project Plan (QAPP) included in Appendix C as a separate document.

Figures

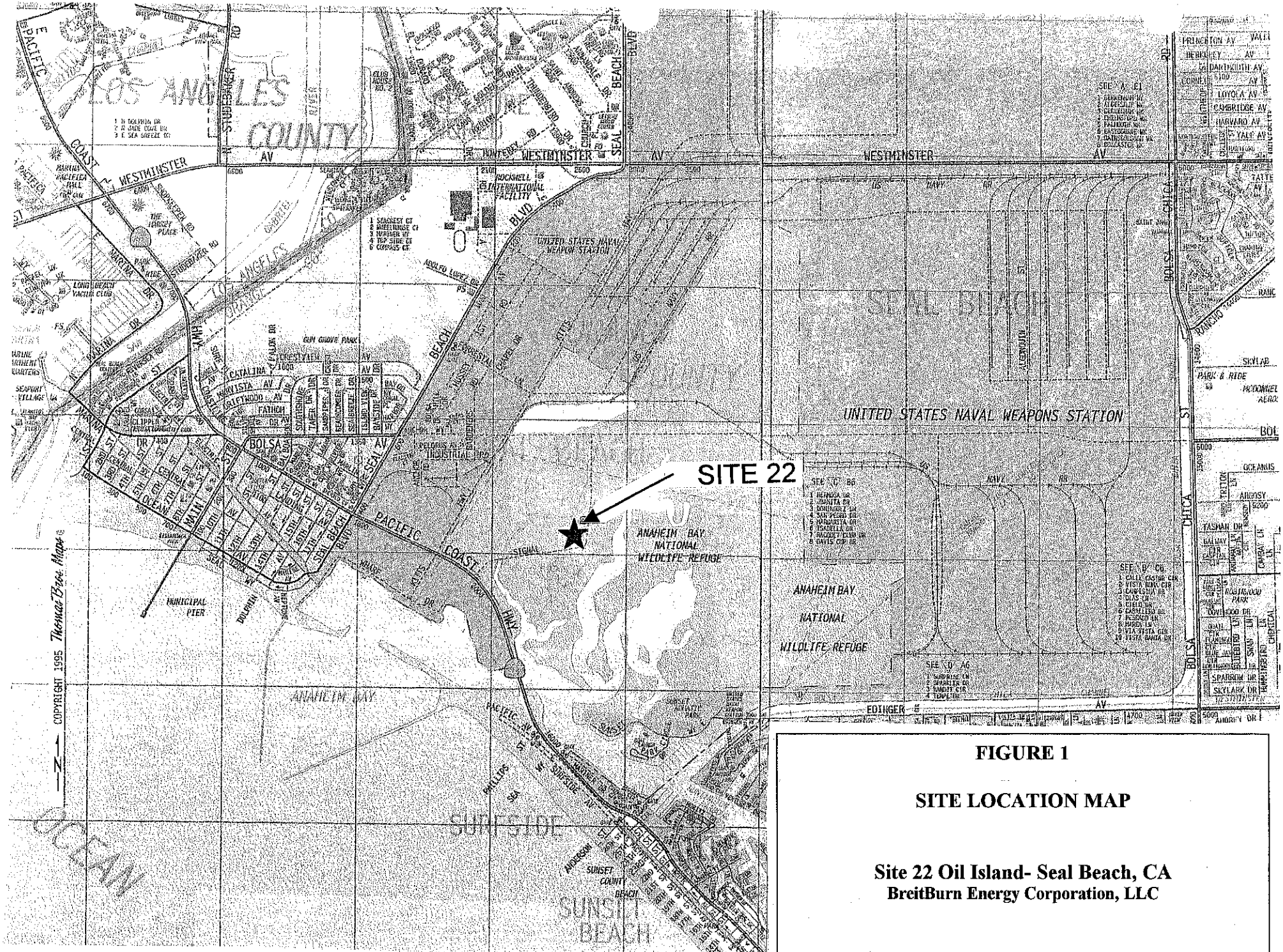
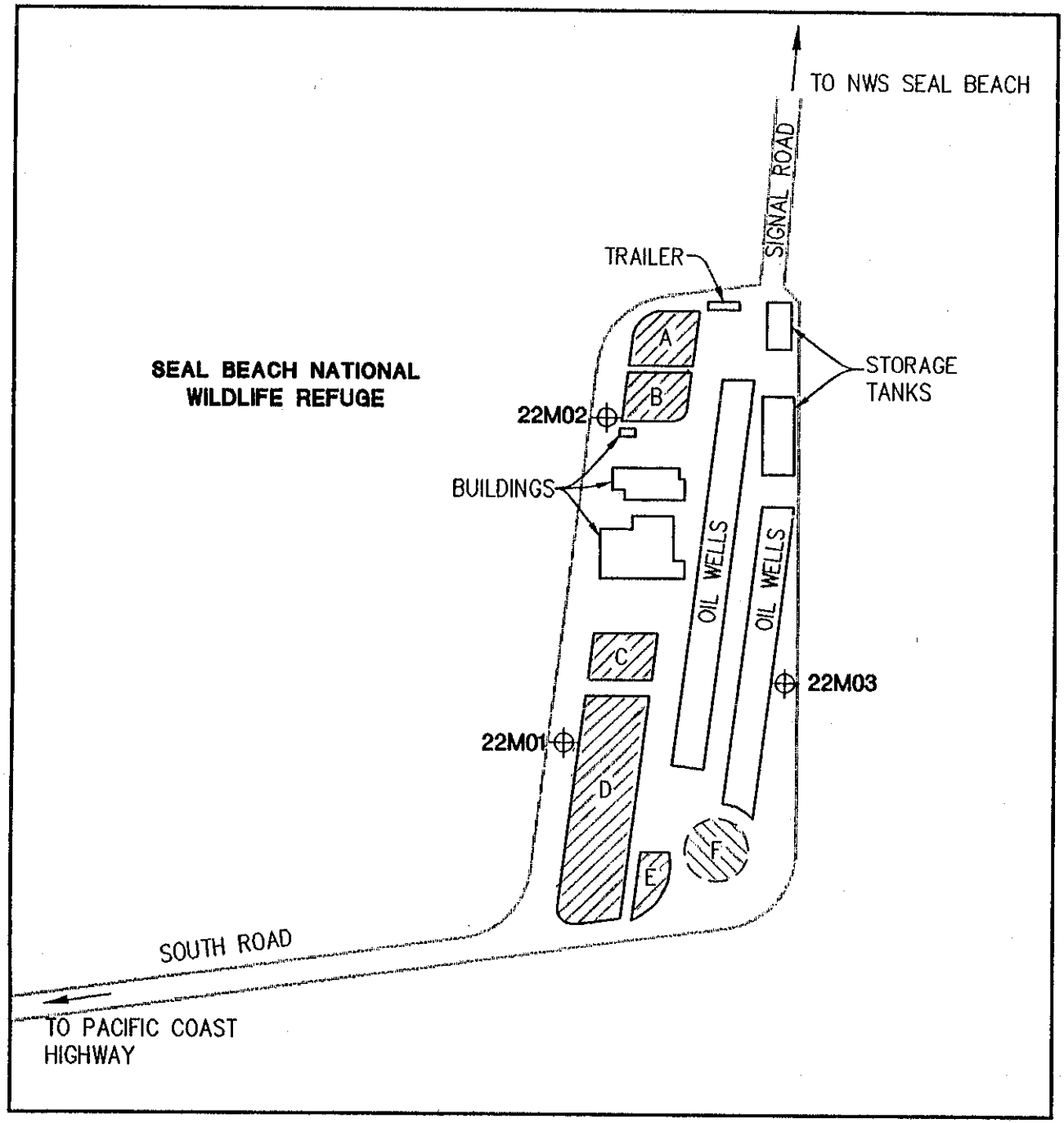
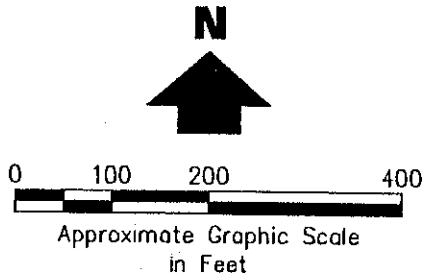


FIGURE 1

SITE LOCATION MAP

Site 22 Oil Island- Seal Beach, CA
BreitBurn Energy Corporation, LLC





LEGEND

22M01 GROUNDWATER MONITORING WELL

LAGOON (POND)

FILLED LAGOON

FIGURE 2

PLOT PLAN

Site 22 Oil Island- Seal Beach, CA
BreitBurn Energy Corporation, LLC

Appendix A

WORK PLAN FOR SITE 22

BREITBURN ENERGY COMPANY

November 15, 1999

K/J 992306 00

Prepared for:

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1 INTRODUCTION

One of the sites under investigation at Naval Weapons Station (NWS) Seal Beach is leased by BreitBurn Energy Company, LLC (BEC). The site is designated Site 22 and is depicted in Figure 1. In an Interim Investigation Report for Site 22, dated 5 August 1998, it was recommended that additional studies be undertaken to determine whether the site poses any potential contamination to the NWS and the local environment.

This report contains a specific workplan to implement the additional studies recommended in the above-referenced report and requested by the SARWQCB in a letter dated 14 September 1999. The workplan contains the following tasks:

- Conduct additional groundwater sampling and analysis at the three onsite groundwater monitoring wells to confirm previous groundwater data
- Evaluate radiological data obtained from the additional groundwater sampling to determine whether the radiological contamination is from naturally occurring sources or man-made.
- Evaluate existing data to provide additional technical support to verify that there is no interconnection between the ponds, the drill site and adjacent wetland areas under tidal influence.

2 TASK 1 - GROUNDWATER SAMPLING ACTIVITIES

Three groundwater monitoring wells are installed at Site 22 (Figure 1). Four groundwater-sampling events have occurred, from July 1994 to May 1995. Another groundwater sampling event is to be taken as soon as the SARWQCB approves this work plan. The samples will be analyzed for the constituents (both unfiltered and filtered) as shown in Table 1. These constituents are the same as those previously analyzed except that lead has been added and cadmium has been removed as was mutually agreed between the Navy and BEC.

The groundwater samples will be collected following purging of the wells, which includes monitoring of field parameters (e.g., pH, conductivity, and temperature). Purging will be accomplished with a submersible pump or by manual bailing. Purge water will be placed in 55-gallon drums. Once the composition of the purge water is known, the purge water will be managed in an approved manner.

The groundwater samples will be collected in laboratory-provided sample bottles, labeled, and placed under chain-of-custody protocols and placed in an ice-filled cooler for transportation to a state-certified analytical laboratory. The current laboratory selected for the analytical work identified in Table 1 is Truesdail Laboratories, Inc. (a State Certified Laboratory). A duplicate field sample will be collected from Well 22M02 and an equipment rinsate blank sample will be collected for QA/QC purposes.

3 TASK 2 - RADIOLOGICAL ANALYSIS OF GROUNDWATER

Previous groundwater samples have been analyzed for gross alpha and gross beta analyses as part of the initial characterization of the radioactivity in the groundwater at Site 22. It is proposed to analyze the groundwater samples collected in the above task for the following parameters:

- Gross alpha/beta analysis by EPA method 900.0 or 00.02
- Radium-226 by EPA Method 903.1
- Radium-228 by EPA Method 904.0
- Total Uranium by EPA Method 908.0 or alpha spectroscopy
- Radon by SM 7500-Rn or equivalent (unfiltered samples only)
- Gamma emitters by EPA Method 901.1

Table 1 contains a listing of the various samples to be taken and the test methods to be used to perform these analyses. The groundwater samples will be analyzed both unfiltered and filtered (except as noted above). The purpose of the filtering is to determine whether the radioactivity is from the suspended solids or from dissolved constituents in the groundwater sample.

The radiological analysis of the groundwater samples will be performed at a State Certified Laboratory. The currently selected lab is Thermo Nutech, a ThermoRetec Company located in Richmond, California.

Dr. Joe Drago will analyze the data to determine whether the radioactivity is from naturally occurring sources or from other man-made sources. Dr Drago has worked on a number of projects involving naturally occurring sources and is quite familiar with these types of analyses. *(Note: Per the request of the Navy, Dr. Drago's resume is included at the end of this report.)*

4 TASK 3 - EVALUATION OF TIDAL INFLUENCE

The Interim Investigation Report concluded that a tidal influence study was not necessary because the ponds at Site 22 were dry in the summer, and the bottoms of the ponds are below high tide levels. This indicates that water levels in the ponds are not influenced by tidal action. The Navy requested that an evaluation of seepage and infiltration rates for water contained in the ponds be performed using available information.

The potential for water impounded in the lagoon to seep through the ponds and reach the groundwater will be estimated by employing factors including the depth of the impounded water, the thickness and hydraulic conductivity of the material underlying the pond, and the depth from the pond bottom to the surrounding groundwater. Existing survey data will be used to derive the depth of the pond. A range of values for the hydraulic conductivity and the thickness of the basal materials of the ponds will be used. Estimated seepage and infiltration rates will be compared to published information on evaporation rates for the location.

5 FINAL REPORT

A report presenting the findings of this work will be prepared and submitted to the Navy, DTSC and the SARWQCB. The report will include data in tabular fashion so that comparisons can be made with previously obtained data. An evaluation of the radiological analyses will be included, as well as an evaluation of the surface impoundment impacts to the local environment

TABLES

Table 1
Proposed Analyses
BreitBurn Energy Company, Site 22

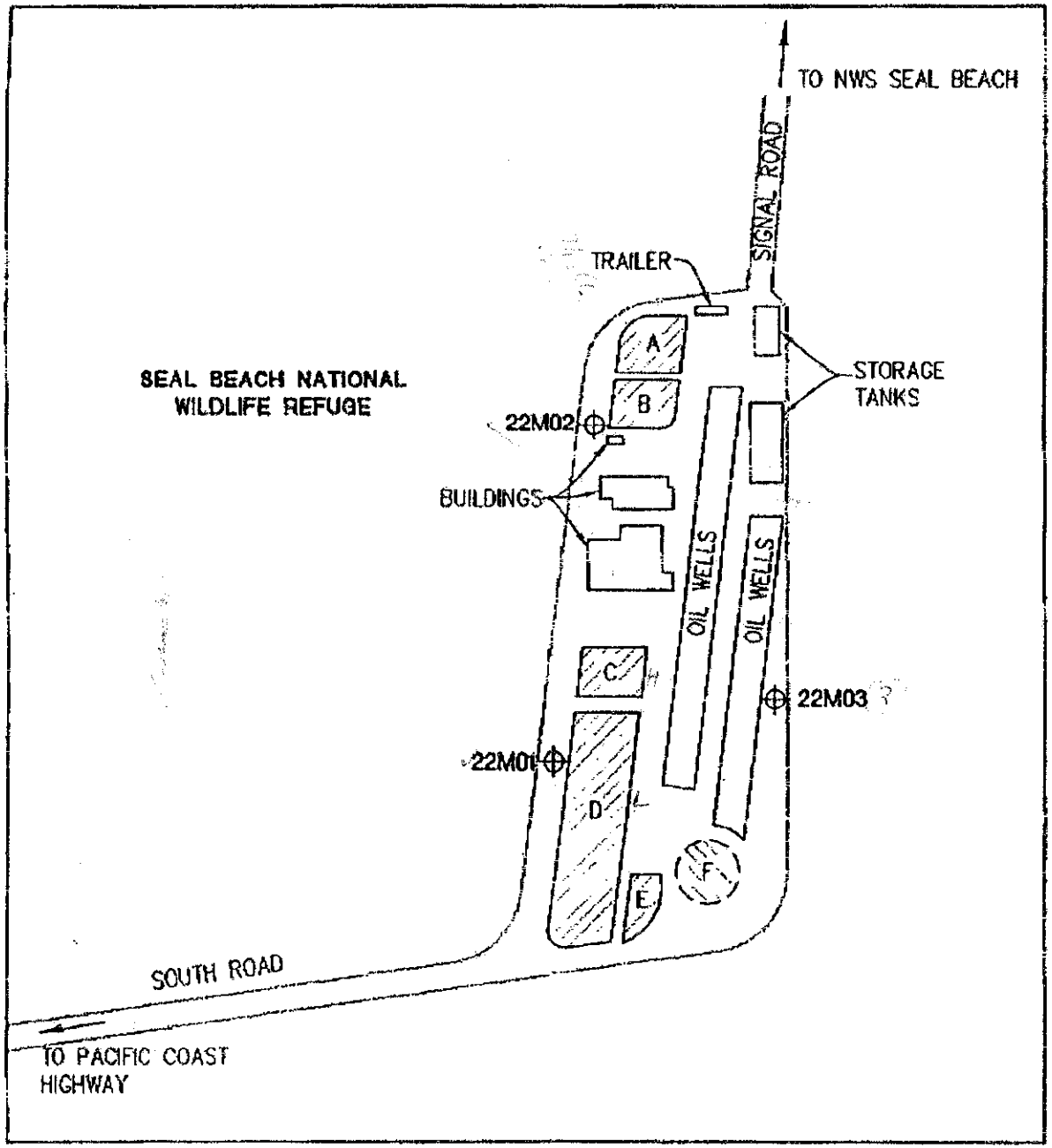
Analysis	Well 22M01 Unfiltered/Filtered	Well 22M02 Unfiltered/Filtered	Well 22M03 Unfiltered/Filtered	Equipment Rinsate Unfiltered/Filtered	TOTAL
RADIOACTIVITY					
Gross alpha/beta (EPA 900.0 or 0-02)	1/1	2/2	1/1	1/1	10
Radium-226 (EPA 903.1)	1/1	2/2	1/1	1/1	10
Radium-228 (EPA 904.0)	1/1	2/2	1/1	1/1	10
Total Uranium (EPA 908.0 or alpha spectroscopy)	1/1	2/2	1/1	1/1	10
Radon (SM 7500-Rn or eqivalent)	1/0	2/0	1/0	1/0	5
Gamma emmiters (EPA 901.1)	1/1	2/2	1/1	1/1	10
METALS					
EPA 6101[a]	1/1	2/2	1/1	1/0	9
Mercury (EPA 7470/7471)	1/1	2/2	1/1	1/0	9
GENERAL CHEMISTRY					
Alkalinity (EPA 403[b])	1/0	2/0	1/0	0	4
Chlorides (EPA 310.1/310.2)	1/0	2/0	1/0	0	4
PH (EPA 150.1)	1/0	2/0	1/0	0	4
Specific conductivity (EPA 120.1)	1/0	2/0	1/0	0	4
Sulfate (EPA 300.0)	1/0	2/0	1/0	0	4
Total Dissolved Solids (EPA 160.1)	0/1	0/2	0/1	0	4
TOTALS					

NOTES:

(a) EPA 6101 includes: aluminum, arsenic, barium, beryllium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, thallium, vanadium, zinc.

(b) Alkalinity includes biocarbonate alkalinity, carbonate alkalinity, and total alkalinity as carbonate.

FIGURES



N

0 100 200 400

Approximate Graphic Scale in Feet

LEGEND

22M01 GROUNDWATER MONITORING WELL

LAGOON (POND)

FILLED LAGOON

Kennedy/Jenks Consultants

Breit Burn Energy Company, LLC
NWS Seal Beach

Site 22

K/J 980001.00

Figure 1

13 January 2000

Ms. Patricia A. Hannon
DoD Section
California Regional Water Quality Control Board
Santa Ana Region
3737 Main Street, Suite 500
Riverside, California 92501-3339

Subject: WORK PLAN FOR SITE 22 AT NAVAL WEAPONS STATION – Revision1
SEAL BEACH, CA

Dear Ms. Hannon:

In response to your telephone conversation on 5 January 2000 with our consultant, Raymond E. Ouellette with Kennedy/Jenks Consultants, we have revised our Work Plan to complete the investigation at Site 22 NWS, Seal Beach, CA. Specifically, we have indicated the procedures to be used to determine when the well has been sufficiently purged to allow a representative sample of water to be obtained for monitoring. All purge water will be collected and disposal options will be considered following receipt of analytical results. Secondly, we have provided more detail on the specific methodology we will be using to demonstrate the potential for infiltration into the groundwater from the various surface impoundments located on Site 22.

As indicated in your telephone discussion, this work plan will be implemented as soon as it is reviewed and approved by you. Some modifications to meet the DOD Field Sampling Plan and Quality Assurance Project Plan guidelines may need to be incorporated prior to the start of the project. These issues will be discussed with the NAVY prior to our beginning the field activities.

If you have any questions, please call our consultant, Raymond E. Ouellette at (949) 261-1577 or me

Very truly yours,

Signer

Title

Enclosure
e:\brelburn\000113a.doc

Department of Toxic Substances Control
Attn: Kathrine Leibel
5796 Corporate Ave.
Cypress, CA 90630

U.S. Fish & Wildlife Service
Seal Beach National Wildlife Refuge
Attn: John Bradley
P. O. Box 815
Seal Beach, CA 90740

cc: Naval Facilities Command
Southwest Division
Attn: Andrew Dick
1220 Pacific Highway
San Diego, CA 92132

Department of Toxic Substances Control
Attn: Kathrine Leibel
5796 Corporate Ave.
Cypress, CA 90630

U.S. Fish & Wildlife Service
Seal Beach National Wildlife Refuge
Attn: John Bradley
P. O. Box 815
Seal Beach, CA 90740

2 TASK 1 - GROUNDWATER SAMPLING ACTIVITIES

Three groundwater monitoring wells are installed at Site 22 (Figure 1). Four groundwater-sampling events have occurred, from July 1994 to May 1995. Another groundwater sampling event is to be taken as soon as the SARWQCB approves this work plan. The samples will be analyzed for the constituents (both unfiltered and filtered) as shown in Table 1. These constituents are the same as those previously analyzed except that lead has been added and cadmium has been removed as was mutually agreed between the Navy and BEC .

Prior to beginning groundwater sampling activities, the depth to groundwater and depth to the bottom of each well will be measured using a water level indicator. All measurements will be made in reference to a marked location on the edge of the monitoring well casing. The water column height in each well will be used to calculate the casing purge volume.

A clean submersible pump or bailer will be used to purge the water from the monitoring well. Field parameters, pH, temperature, and electrical conductivity will be measured at least initially and at the end of each purge volume. Purging shall be considered complete when a minimum of three purge volumes has been removed and the pH measurements are within 0.5 of the previous measured value and temperature and conductivity are with 10% of the previous measured values. If the well is purged dry, then once the well has recovered to 80 percent of the measure static water level it will be purged dry again and sampled when it recovers to 80 percent again.

Groundwater samples will be collected by lowering a bailer into the well and placing the samples into laboratory provided containers, labeled (sample number, collection time and date, project number, and sampler's initials), and placed under chain-of custody protocol in an ice-filled cooler. Table 1 lists the type and number of analyses proposed at Site 22. The current laboratory selected to perform this analytical work is Truesdail Laboratories, Inc. (a State Certified Laboratory).

Purge water will be collected in 55-gallon drums for disposal. Each drum will be labeled with the name of the source (well number), date, and name and phone number of the responsible party. Following receipt of analytical results disposal options for the drummed water will be considered.

An equipment rinsate blank will be collected to verify the effectiveness of the decontamination procedures. Equipment rinsate samples will be analyzed for all constituents (except general chemistry).

A field duplicate will also be collected and assigned an independent sample number to assess the reproducibility of the analytical laboratory's results.

Appendix B

California Regional Water Quality Control Board
Santa Ana Region

inston H Hickox
Secretary for Environmental Protection

Internet Address: http://www.swrcb.ca.gov/rwqcb8
3737 Main Street, Suite 500, Riverside, California 92501-3348
Phone (909) 782-4130 - FAX (909) 781-6288

Gray Davis
Governor

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our website at www.swrcb.ca.gov/rwqcb8.

January 7, 2002

Mr. Pat Gorski
BreitBurn Energy Company LLC
515 South Flower Street, Suite 4800
Los Angeles, CA 90071

COMMENTS ON DRAFT FIELD SAMPLING PLAN AND QUALITY ASSURANCE PROJECT PLAN FOR WATER SAMPLING AT SITE 22, OIL ISLAND, NAVAL WEAPONS STATION, SEAL BEACH

Dear Mr. Gorski:

We have completed our review of the above-referenced document, dated April 11, 2001, which we received on April 11, 2001. We do not have any significant comments.

If you should have any questions, please call me at (909) 782-4498, or send e-mail to phannon@rb8.swrcb.ca.gov.

Sincerely,

Patricia A. Hannon
SLIC/DoD/AGT Section

cc: Ms Pei-Fen Tamashiro, Naval Weapons Station, Seal Beach
Ms. Katherine Leibel, Dept of Toxic Substances Control
Mr. Si Le, Naval Facilities Engineering Command, SWDIV
Mr. John Bradley, Seal Beach National Wildlife Refuge
Ms. Nancy Beresky, Waterstone Environmental, Inc.

Department of Toxic Substances Control

Edwin F. Lowry, Director
5796 Corporate Avenue
Cypress, California 90630

Winston H. Hickox
Secretary for
Environmental
Protection

Gray Davis
Governor

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL # of pages ▶ 7

To Pat Gorski	From Andrew Dick
Dept./Agency Breitburn	Phone # (619) 532-1153
Fax # (310) 915-7279	Fax # (619) 532-3546

NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

February 29, 2000

Ms. Pei-Fen Tamashiro
Naval Weapons Station, Seal Beach
800 Seal Beach Boulevard
Seal Beach, California 90740-5000

REVIEW OF DRAFT WORK PLAN DATED NOVEMBER 15,1999, FOR SITE 22 NAVAL WEAPONS STATION, SEAL BEACH

Dear Ms.Tamashiro:

The Department of Toxic Substances Control has reviewed the subject work plan prepared by Kennedy/Jenks Consultants of Irvine for Brietburn Energy Company, Los Angeles. Upon review, the Department of Toxic Substances Control has the enclosed comments.

If you have any questions, please call me at (714) 484-5446.

Sincerely,

Katherine Leibel
Remedial Project Manager
Southern California Branch
Office of Military Facilities

Enclosure:

cc: Ms. Patricia A. Hannon
California Regional Water Quality Control Board
3737 Main Street, Suite 500
Riverside, California 92501-3339

cc: Mr. Andrew Dick
Remedial Project Manager
SWDIV Naval Facilities Engineering Command
1220 Pacific Coast Highway
San Diego, California 92132-5190

Mr. Mario Voce
730 Catalina Avenue
Seal Beach, California 91740-5848

Ms. Marie McCrink (w/out enclosure)
Site Mitigation Branch
Geologic Services Unit
10151 Croydon Way, Suite 3
Sacramento, California 95827-2106

TO: Katherine Leibel
Office of Military Facilities
5796 Corporate Avenue
Cypress, California 90630

FROM: Marie T. McCrink, R.G.,C.H.
Site Mitigation Branch
Geologic Services Unit
10151 Croydon Way, Suite 3
Sacramento, California 95827-2106

Reviewed by:
Mike Kenning, R.G.
Geologic Services Unit

DATE: February 24, 2000

SUBJECT: **Review of Work Plan for Site 22, Naval Weapons Station, Seal Beach, dated November 15, 1999** (log # 991139)

Per your request, the Geologic Services Unit (GSU) has reviewed the **Work Plan for Site 22, Naval Weapons Station, Seal Beach.** The report was prepared by Kennedy/Jenks Consultants of Irvine, CA for Breitburn Energy Company (BEC), Los Angeles, CA. Also, per your request, a brief review of the issues of concern for Site 22 identified in the Final Remedial Investigation (RI) Report has been included.

BACKGROUND

An investigation of Site 22, Oil Island, was conducted during the remedial investigation for Operable Units 1, 2, and 3. The findings were reported in the Final RI Report dated, 15 December 1995 prepared by CH2MHill. Site 22 is located approximately 3,000 feet east-southeast of IR Site 40. The Site is situated within the Seal Beach National Wildlife Refuge (NWR), and is surrounded by wetlands on all sides. The Seal Beach NWR serves as a breeding habitat to two endangered species, the California least tern and the light-footed clapper rail. Therefore, the impact on ecological receptors is the primary concern at Site 22.

Based on the Ecological Risk Assessment (EcoRA) conducted as part of the RI, cadmium, xylenes, and polynuclear aromatic hydrocarbons (PAHs) were identified as contaminants of concern (COCs) for soils. Arsenic, copper, lead, nickel, and zinc were identified as

COCs for groundwater. In addition, anomalously high levels of gross alpha and gross beta, not attributable to ^{40}K, were detected in groundwater. Also, chromium and cobalt concentrations were both detected above the aquatic water quality criteria (AWQC) but not identified as COCs. Based on technical reviews by the Human and Ecological Risk Section (HERD) and the GSU, the following recommendations were made concerning the RI Report:

- Provide complete details of the removal action proposed for soils;
- Reevaluate the risk assessment methodology for soils and sediments to comply with state guidelines so that cleanup levels could be established;
- Develop a groundwater monitoring program to monitor metals in groundwater, and compare detected concentrations to station-wide background values or the AQWC, or whichever is lower if both are available; and
- Determine the source of the anomalously high levels of gross alpha and gross beta, not attributable to ^{40}K;

On 5 August 1998, the Interim Investigation for Site 22 was submitted by Kennedy/Jenks Consultants on behalf of Breitburn Energy Company. The Interim Investigation reported on the source of the fill material used at Site 22, presented available options to discourage wildlife from coming in contact with soils in and around the ponds that formerly contained drilling mud returns, and identified additional data needs. To meet the identified data needs, the Interim Investigation proposed to collect additional groundwater samples to confirm total and dissolved metal concentrations, to collect additional groundwater samples to identify the source of gross alpha and gross beta activity, and to determine if there is a hydraulic connection between the ponds and surrounding wetlands.

The subject document, *Work Plan for Site 22*, dated November 15, 1999, proposes the following tasks:

- Conduct the additional groundwater sampling and analysis to confirm previous groundwater data;
- Evaluate the sources of radiological data obtained from additional groundwater sampling and analysis; and
- Evaluate existing data to verify there is no interconnection between the ponds, the drill site, and adjacent wetland areas under tidal influence.

COMMENTS

1. ***Introduction, Figure 1, Site 22 Location Map.*** The site location map shows a large scale map of Site 22, which includes details specific to Site 22.

The GSU recommends a smaller scale location map be included in the work plan that shows Site 22 relative to the entire Naval Weapons Station. A map of Site 22, which shows its location completely surrounded by the NWR, is critical to understanding issues of concern for Site 22.

2. ***Introduction.*** This work plan proposes the three tasks listed above in the Introduction.

The GSU recommends this work plan include a fourth task:

> Provide an update on the status of implementing the RI recommendation that Site 22 be made unattractive to wildlife by minimizing the opportunities for wildlife to come in contact with soils in the ponds.

The Interim Investigation dated August 5, 1998, proposed that the most appropriate response to discourage the presence of wildlife would be to remove vegetation and minimize water levels in the ponds. The GSU's comments on the Interim Investigation dated December 12, 1998, recommended that documentation be provided to show this was an effective solution. The GSU recommends that observations be made of the quantity and type of wildlife stopping by the ponds compared to the surrounding wetlands, and photographs be compiled that show the lack of vegetation and lack of standing water in the ponds. These items should be submitted in the status report.

3. ***Task 1 - Groundwater Sampling Activities.*** The work plan states that four groundwater sampling events have occurred from July 1994 to May 1995.

The GSU recommends that the data from all four groundwater sampling events be included in this work plan. Table 4-29 in the Final RI Report, contains data for three rounds of groundwater sampling. It is unclear when the fourth sampling event occurred and in which document that data is reported. In addition, review of this work plan would be expedited if all available groundwater data for Site 22 are presented here.

4. ***Task 1 - Groundwater Sampling Activities.*** This section states that groundwater samples will be analyzed for the same constituents (filtered and unfiltered) as those previously analyzed, except that lead has been added and cadmium has been deleted as was mutually agreed between the Navy and BEC.

The GSU recommends that cadmium be kept on the list of groundwater analytes because it was identified as a COC for soils and sediments. In addition, cadmium was not analyzed in groundwater samples that were collected during the remedial investigation. Therefore, groundwater should be evaluated to ensure cadmium has not leached to groundwater. Finally, the GSU recommends that the decision to delete cadmium from the list of analytes be reviewed by the Santa Ana Regional Water Quality Control Board, and a joint position from the regulatory agencies be determined.

5. ***Task 3 - Evaluation of Tidal Influence.*** This work plan states that the Interim Investigation concluded a tidal influence study was not necessary because the ponds at Site 22 were dry in the summer, and the bottoms of the ponds are below high tide levels.

The GSU does not find that conclusion reported in the Interim Investigation. The following conclusion on this issue is found on page 10 of that document.

> *"If as expected, the ponds become dry in the summer, this should be documented to provide direct evidence that there is not a connection with the bay water. Alternatively, a tidal influence study could be performed during the wet season to determine if the stormwater stored in the ponds is in contact with bay surface water. The results of either approach, in conjunction with the results of the groundwater monitoring, will be important in determining if remediation of the ponds is required."*

The GSU does not concur with the proposal that a tidal influence study is unnecessary. Dry ponds in summer only is not complete evidence that there is no hydraulic connection between the ponds and the wetlands. The GSU recommends that BEC be required to submit a work plan to perform a tidal influence survey, like that which was described in Section 4.3.2 of the Interim Investigation. To recommend approval for no removal action at the ponds, the presence or lack of interconnection should be verified by several lines of evidence. If BEC does not want to do a tidal influence study, then a removal action should be required.

In addition, the GSU recommends that BEC be required to collect and submit the other field documentation data to verify the presence or absence of a hydraulic connection between the ponds and surrounding wetlands. As proposed in Section 4.3.3 of the Interim Investigation, BEC should provide the following:

- Photographs of the pond bottoms during high tide. The GSU recommends that photographs be compiled from each month throughout the year, including all high-high tide events;

- Measurements of the pond depths. The GSU recommends these depths be determined by a licensed surveyor; and

- Site visit by regulatory personnel. The GSU recommends regulatory personnel visit during at least one high-high tide event and one major storm event.

If you have any questions, please call me at (916) 255-3691.

cc: Steve Sterling, GSU Supervisor, DTSC, Sacramento

Department of Toxic Substances Control

Edwin F. Lowry, Director
5796 Corporate Avenue
Cypress, California 90630

Winston H. Hickox
Agency Secretary
California Environmental
Protection Agency

Gray Davis
Governor

July 19, 2001

Mr. Patrick L. Gorski
Environmental, Health and Safety Director
BreitBurn Energy Company LLC
515 South Flower Street, Suite 4800
Los Angeles, CA 90071

REVIEW OF DRAFT FIELD SAMPLING PLAN AND QUALITY ASSURANCE PROJECT PLAN FOR WATER SAMPLING, SITE 22 OIL ISLAND, NAVAL WEAPONS STATION, SEAL BEACH, DATED MARCH 22, 2001

Dear Ms.Tamashiro:

The Department of Toxic Substances Control (DTSC) has reviewed the subject Field Sampling Plan prepared by Waterstone Environmental, Inc. of Fullerton, CA for BrietBurn Energy Company LLC. Upon review, DTSC has the enclosed comments.

If you have any questions, please call me at (714) 484-5446.

Sincerely,

Katherine Leibel
Remedial Project Manager
Office of Military Facilities

Enclosure:

cc: Ms. Patricia Hannon
Santa Ana Region
California Regional Water Quality Control Board
3737 Main Street, Suite 500
Riverside, California 92501-3339

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Department of Toxic Substances Control

Edwin F. Lowry, Director
10151 Croydon Way, Suite 3
Sacramento, California 95827-2106

Winston H. Hickox
Agency Secretary
California Environmental
Protection Agency

Gray Davis
Governor

TO: Katherine Leibel, Project Manager
Office of Military Facilities
5796 Corporate Avenue
Cypress, California 90630

FROM: Marie T. McCrink, RG, CH
Site Mitigation Branch
Geologic Services Unit
10151 Croydon Way, Suite 3
Sacramento, California 95827-2106

Reviewed by:
Mike Finch, RG
Geologic Services Unit

DATE: May 18, 2001

SUBJECT: **Review of Draft Field Sampling Plan and Quality Assurance Project Plan for Water Sampling, Site 22 Oil Island, Naval Weapons Station, Seal Beach, dated April 11, 2001** (log # 001172)

ACTIVITY REQUESTED

Per your request, the Geologic Services Unit (GSU) has reviewed the **Draft Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP) for Water Sampling, Site 22 Oil Island, Naval Weapons Station, Seal Beach**. The report was prepared by Waterstone Environmental, Inc. of Fullerton, CA, for the Department of the Navy, Southwest Division, Naval Facilities Engineering Command, San Diego. The document is dated April 11, 2001, and was received by GSU on April 19, 2001. As per our agreement, the GSU committed to a completed review of the subject document on May 18, 2001.

The GSU was requested to evaluate the technical adequacy of the hydrogeologic aspects of this FSP.

REVIEW ACTIVITIES

Review activities consisted of reading the subject sampling plan, reviewing the file on Site 22 investigative activities, and providing comments and recommendations on the subject document.

The GSU recommends that the condition of wetness and/or dryness of all former pond bottoms be observed and recorded during Task 3 activities.

The GSU also recommends that a minimum of two pond bottom samples be collected to evaluate the thickness and hydraulic conductivity of pond bottom material, and the elevation of pond bottom and island fill soil interfaces. There are five former unfilled ponds, the site extends over 800 feet in the north/south direction, and one pond bottom sample does not seem adequate to evaluate pond infiltration rates and potential communication with groundwater for the entire site. The site appears to be divisible into two distinct areas; a northern portion comprised of Ponds A and B, and a southern portion comprised of ponds C, D, and E. Therefore, we recommend separate samples be collected from the southern and northern portion of the Site. A sample from Pond B near monitoring well 22M02 and a sample from Pond D near well 22M01 would seem to be potentially good choices for comparison of pond saturation elevations to water level elevations.

4. Section 2.3 - Task 3. On page 11, it is stated in the text that Waterstone proposes to measure groundwater elevations in the Site 22 monitoring wells at the same time as collecting the soil sample from the pond bottom.

The GSU recommends that the precise meaning of *"at the same time"* be explained. To ensure a valid comparison in a tidally influenced environment, it appears necessary to collect simultaneous water level measurements from the monitoring wells and the soil boring. It is unclear if that is what is proposed in the text.

If you have any questions, please call me at (916) 255-3691.

cc: Stewart Black, GSU Supervisor, DTSC, Sacramento

PROJECT SUMMARY

There are two primary objectives for this project. The first objective is to conduct additional groundwater sampling and analysis to confirm previous groundwater data and determine whether the elevated levels of gross alpha and gross beta detected in groundwater are manmade or naturally occurring. The second objective is to gather additional data to evaluate whether the bottom of former drilling mud holding lagoons are in communication with groundwater and/or surrounding tidally influenced surface water.

COMMENTS AND RECOMMENDATIONS

1. Section 2.2.6 - Groundwater Analysis. On page 10, it is stated in the text that groundwater samples will be evaluated for metals concentrations using EPA Method 6010B (Title 22 Metals) and EPA Method 7470/7471 (for Mercury).

   The GSU requests that the specific metals included in EPA Method 6010B be provided in a response to comments format. In particular, we want to ensure the method includes the analysis of cadmium (Cd), arsenic (As), copper (Cu), lead (Pb), nickel (Ni), zinc (Zn), chromium (Cr), and cobalt (Co). Previously, Cd was identified as a contaminant of concern (COC) for soils, but was not included in groundwater analyses conducted during the remedial investigation; As, Cu, Pb, Ni, and Zn were identified as COCs for groundwater and should be reevaluated at this time; and Cr and Co were both reported above the aquatic water quality criteria and should also be reevaluated at this time.

2. Section 2.3 - Task 3. On page 11, it is stated in the text that Waterstone proposes to collect tidal fluctuation measurements on a day when the largest tidal fluctuation range can be measured.

   The GSU recommends that a tidal influence survey be conducted, which includes the day when the largest tidal fluctuation range can be measured. For this specific task, we understand the need to measure the largest fluctuation possible. However, for long term monitoring and risk evaluation, a survey like that conducted at IR Site 5 in December, 1998 would provide a more accurate estimate of the mean water level for Site 22 at this time of year. It is the GSU's understanding that an estimate of the mean groundwater gradient magnitude and direction has not been conducted at Site 22.

3. Section 2.3 - Task 3. On page 11, it is stated in the text that Waterstone proposes to collect a core of soil in the bottom of the driest pond during lowest low tide from an exploratory boring.

The GSU recommends that the condition of wetness and/or dryness of all former pond bottoms be observed and recorded during Task 3 activities.

The GSU also recommends that a minimum of two pond bottom samples be collected to evaluate the thickness and hydraulic conductivity of pond bottom material, and the elevation of pond bottom and island fill soil interfaces. There are five former unfilled ponds, the site extends over 800 feet in the north/south direction, and one pond bottom sample does not seem adequate to evaluate pond infiltration rates and potential communication with groundwater for the entire site. The site appears to be divisible into two distinct areas; a northern portion comprised of Ponds A and B, and a southern portion comprised of ponds C, D, and E. Therefore, we recommend separate samples be collected from the southern and northern portion of the Site. A sample from Pond B near monitoring well 22M02 and a sample from Pond D near well 22M01 would seem to be potentially good choices for comparison of pond saturation elevations to water level elevations.

4. Section 2.3 - Task 3. On page 11, it is stated in the text that Waterstone proposes to measure groundwater elevations in the Site 22 monitoring wells at the same time as collecting the soil sample from the pond bottom.

The GSU recommends that the precise meaning of *"at the same time"* be explained. To ensure a valid comparison in a tidally influenced environment, it appears necessary to collect simultaneous water level measurements from the monitoring wells and the soil boring. It is unclear if that is what is proposed in the text.

If you have any questions, please call me at (916) 255-3691.

cc: Stewart Black, GSU Supervisor, DTSC, Sacramento

RESPONSE TO COMMENTS
DRAFT FIELD SAMPLING PLAN AND QUALITY ASSURANCE PROJECT PLAN FOR WATER SAMPLING (DATED APRIL 11, 2001)
SITE 22 OIL ISLAND
NAVAL WEAPONS STATION
SEAL BEACH, SEAL BEACH, CA

Comments by:	Marie T. McCrink, RG, CH, Site Mitigation Branch, GSU, DTSC
Comments Dated:	May 18, 2001
Response by:	Nancy Beresky, Principal Hydrogeologist, Waterstone Environmental, Inc.
Response Dated:	July 22, 2002

Number	Comment	Response
1.	Section 2.2.6 - Groundwater Analysis. On Page 10, it is stated in the text that groundwater samples will be evaluated for metals concentrations using EPA Method 6010B (Title 22 Metals) and EPA Method 7470/7471 (for Mercury). The GSU requests that the specific metal included in EPA Method 6010B be provided in a response to comments format. In particular, we want to ensure the method includes the analysis of cadmium(Cd), arsenic (As), copper (Cu), lead (Pb), nickel (Ni), zinc (Zn), chromium (Cr), and cobalt (Co). Previously, Cd was identified as a contaminant of concern (COC) for soils, but was not included in groundwater analyses conducted during the remedial investigation; As, Cu, Pb, Ni, and Zn were identified as COCs for groundwater and should be reevaluated at this time; and Cr and Co were both reported above the aquatic water quality criteria and should also be reevaluated at this time.	The requested metals (Cd, As, Cu, Pb, Ni, Zn, Cr, and Co) will be analyzed as requested. Please refer to Section 2.2 of the Field Sampling Plan and Quality Assurance Project Plan for Water Sampling.
2.	Section 2.3 - Task 3. On page 11, it is stated in the text that Waterstone proposes to collect tidal fluctuation measurements on a day when the largest tidal fluctuation range can be measured. The GSU recommends that a tidal influence survey be conducted, which includes the day when the largest tidal fluctuation range can be measured. For this specific task, we understand the need to measure the largest fluctuation possible. However, for long term monitoring and risk evaluation, a survey like that conducted at IR Site 5 in December, 1998 would provide a more accurate estimate of the mean water level for Site 22 at this time of year. It is the GSU's understanding that an estimate of the mean groundwater gradient magnitude and direction has not been conducted at Site 22.	The Navy and oversight agencies have requested that an evaluation of seepage and infiltration rates for water contained in the ponds at Oil Island be performed using available information. The potential for water impounded in the lagoons (if any) to seep through the ponds and reach the underlying, tidally-influenced groundwater will be evaluated. To perform the evaluation, the following data will be collected: 1. Thickness and hydraulic conductivity of pond bottom material 2. Elevation of pond bottom/island fill soil interface 3. Range of tidal fluctuations in Oil Island monitoring wells Although the recommendation was to use available information, we have proposed this additional scope of work because we believe this information is necessary to determine whether groundwater is in contact with pond bottom material. We respectfully comment that an estimate of the mean groundwater gradient magnitude and direction is not necessary for the evaluation of seepage and infiltration rates and we would appreciate the opportunity to perform our proposed scope of work.

RESPONSE TO COMMENTS
DRAFT FIELD SAMPLING PLAN AND QUALITY ASSURANCE PROJECT PLAN FOR WATER SAMPLING (DATED APRIL 11, 2001)
SITE 22 OIL ISLAND
NAVAL WEAPONS STATION
SEAL BEACH, SEAL BEACH, CA

Comments by:	Marie T. McCrink, RG, CH, Site Mitigation Branch, GSU, DTSC
Comments Dated:	May 18, 2001
Response by:	Nancy Beresky, Principal Hydrogeologist, Waterstone Environmental, Inc.
Response Dated:	July 22, 2002

Number	Comment	Response
		If the data and conclusions that come from the proposed scope are not satisfactory to the DTSC, we would be happy to address additional DTSC comments at that time.
3.	Section 2.3 - Task 3. On page 11, it is stated in the text that Waterstone proposes to collect a core of soil in the bottom of the driest pond during lowest low tide from an exploratory boring. The GSU recommends that the condition of wetness and/or dryness of all former pond bottoms be observed and recorded during Task 3 activities. The GSU also recommends that a minimum of two pond bottom samples be collected to evaluate the thickness and hydraulic conductivity of pond bottom material, and the elevation of pond bottom and island fill soil interfaces. There are five former unfilled ponds, the site extends over 800 feet in the north/south direction, and one pond bottom sample does not seem adequate to evaluate pond infiltration rates and potential communication with groundwater for the entire site. The site appears to be divisible into two distinct areas; a northern portion comprised of Ponds A and B, and a southern portion comprised of ponds C, D, and E. Therefore, we recommend separate samples be collected from the southern and northern portion of the Site. A sample from Pond B near monitoring well 22M02 and a sample from Pond D near well 22M01 would seem to be potentially good choices for comparison of pond saturation elevations to water level elevations.	The text has been revised to include GSU recommendations as follows: "Two pond bottom samples will be collected to evaluate the thickness and hydraulic conductivity of pond bottom material, and the elevation of pond bottom and island fill soil interfaces. The site is divisible into two distinct areas; a northern portion comprised of Ponds A and B, and a southern portion comprised of ponds C, D, and E. The condition of wetness and/or dryness of all the former pond bottoms will be observed and recorded prior to collecting pond bottom samples. Waterstone proposes to collect core samples from the bottom of the driest pond in the northern and southern portion of the island. Each core sample will be collected during lowest low tide from an exploratory boring." As an aside, the condition of wetness and/or dryness of all the former pond bottoms has been observed on a continuing basis by BreitBurn personnel for the past year. Other than rainwater that collects in the ponds, no water has ever been observed in the ponds during the highest tides during the dry season.
4.	Section 2.3 - Task 3. On page 11, it is stated in the text that Waterstone proposes to measure groundwater elevations in the Site 22 monitoring wells at the same time as collecting the soil sample from the pond bottom. The GSU recommends that the precise meaning of "at the same time" be explained. To ensure a valid comparison in a tidally influenced environment, it appears necessary to collect simultaneous water level measurements from the monitoring wells and the soil boring. It is unclear if that is what is proposed in the text.	The phrase "at the same time" in the text has been replaced with the word "simultaneously" to more accurately reflect the intent of the sampling plan.

WATERSTONE ENVIRONMENTAL, INC.

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August 6, 2002

Ms. Pei-Fen Tamashiro
Environmental Office (Code N45S)
Naval Weapons Station, Seal Beach
800 Seal Beach Blvd.,
Building 110
Seal Beach, CA 90740-5000

RE: Description of Tidal Influence Study Proposed for BreitBurn Oil Company's Oil Island, Naval Weapons Station, Seal Beach, CA

Dear Ms. Tamashiro:

Thank you for our recent phone conversations wherein you described to us DTSC's requirements for approving our workplan to perform soil and groundwater sampling at the Oil Island. We understand from our conversations with you that a short scope of work is sufficient to provide a description and documentation of the proposed work. It is as follows:

The objective of the proposed tidal influence study is to assess groundwater fluctuations on the Oil Island and compare these fluctuations against tidal variations along the coast available from the National Oceanic and Atmospheric Association (NOAA) and/or from measurements made in open water near the Island. These results will be used, along with other collected data, to determine whether material in the bottom of the dry lagoons or ponds on Oil Island are coming into contact with surrounding open water.

Shallow groundwater levels will be measured in the 2 accessible monitoring wells screened across the water table at Oil Island between 8 August and 12 August 2002. During this time period, a coastal tidal fluctuation of over 7 feet is expected. To assess the influence of tides on groundwater levels, tidal fluctuations will be monitored concurrently from the bridge to Oil Island, if feasible, or tidal tables available from NOAA will be used.

Water level data will be collected each one-half hour in each of the 2 accessible groundwater monitoring wells for a minimum of 72 hours. Water levels will be measured using pressure transducers temporarily installed in the monitoring wells. The data will be collected and stored by an electronic water level recorder (data logger) connected to the transducer. Tidal influence on groundwater levels will be examined by comparing coastal tidal fluctuations to changes in groundwater levels in each of the wells.

We plan to install transducers on Thursday afternoon, August 8, 2002 and perform soil sampling at lowest tide; either at 4:00 am Friday or 5:30 am on Saturday. We will follow this schedule unless we hear otherwise from you by 5pm on Wednesday, August 9, 2002.

Sincerely,

Nancy A. Beresky
Principal Hydrogeologist

13 January 2000

Ms. Patricia A. Hannon
DoD Section
California Regional Water Quality Control Board
Santa Ana Region
3737 Main Street, Suite 500
Riverside, California 92501-3339

Subject: WORK PLAN FOR SITE 22 AT NAVAL WEAPONS STATION – Revision1
SEAL BEACH, CA

Dear Ms. Hannon:

In response to your telephone conversation on 5 January 2000 with our consultant, Raymond E. Ouellette with Kennedy/Jenks Consultants, we have revised our Work Plan to complete the investigation at Site 22 NWS, Seal Beach, CA. Specifically, we have indicated the procedures to be used to determine when the well has been sufficiently purged to allow a representative sample of water to be obtained for monitoring. All purge water will be collected and disposal options will be considered following receipt of analytical results. Secondly, we have provided more detail on the specific methodology we will be using to demonstrate the potential for infiltration into the groundwater from the various surface impoundments located on Site 22.

As indicated in your telephone discussion, this work plan will be implemented as soon as it is reviewed and approved by you. Some modifications to meet the DOD Field Sampling Plan and Quality Assurance Project Plan guidelines may need to be incorporated prior to the start of the project. These issues will be discussed with the NAVY prior to our beginning the field activities.

If you have any questions, please call our consultant, Raymond E. Ouellette at (949) 261-1577 or me

Very truly yours,

Signer

Title

Enclosure
a:\brd\burn\000113a.doc

cc: Naval Facilities Command
Southwest Division
Attn: Andrew Dick
1220 Pacific Highway
San Diego, CA 92132

Department of Toxic Substances Control
Attn: Kathrine Leibel
5796 Corporate Ave.
Cypress, CA 90630

U.S. Fish & Wildlife Service
Seal Beach National Wildlife Refuge
Attn: John Bradley
P. O. Box 815
Seal Beach, CA 90740

2 TASK 1 - GROUNDWATER SAMPLING ACTIVITIES

Three groundwater monitoring wells are installed at Site 22 (Figure 1). Four groundwater-sampling events have occurred, from July 1994 to May 1995. Another groundwater sampling event is to be taken as soon as the SARWQCB approves this work plan. The samples will be analyzed for the constituents (both unfiltered and filtered) as shown in Table 1. These constituents are the same as those previously analyzed except that lead has been added and cadmium has been removed as was mutually agreed between the Navy and BEC .

Prior to beginning groundwater sampling activities, the depth to groundwater and depth to the bottom of each well will be measured using a water level indicator. All measurements will be made in reference to a marked location on the edge of the monitoring well casing. The water column height in each well will be used to calculate the casing purge volume.

A clean submersible pump or bailer will be used to purge the water from the monitoring well. Field parameters, pH, temperature, and electrical conductivity will be measured at least initially and at the end of each purge volume. Purging shall be considered complete when a minimum of three purge volumes has been removed and the pH measurements are within 0.5 of the previous measured value and temperature and conductivity are with 10% of the previous measured values. If the well is purged dry, then once the well has recovered to 80 percent of the measure static water level it will be purged dry again and sampled when it recovers to 80 percent again.

Groundwater samples will be collected by lowering a bailer into the well and placing the samples into laboratory provided containers, labeled (sample number, collection time and date, project number, and sampler's initials), and placed under chain-of custody protocol in an ice-filled cooler. Table 1 lists the type and number of analyses proposed at Site 22. The current laboratory selected to perform this analytical work is Truesdail Laboratories, Inc. (a State Certified Laboratory).

Purge water will be collected in 55-gallon drums for disposal. Each drum will be labeled with the name of the source (well number), date, and name and phone number of the responsible party. Following receipt of analytical results disposal options for the drummed water will be considered.

An equipment rinsate blank will be collected to verify the effectiveness of the decontamination procedures. Equipment rinsate samples will be analyzed for all constituents (except general chemistry).

A field duplicate will also be collected and assigned an independent sample number to assess the reproducibility of the analytical laboratory's results.

Appendix C

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan)

BreitBurn Energy Company - Oil Island Seal Beach, CA

July 10, 2002

APPROVAL PAGE:

Nancy Beresky, Project Manager
Waterstone Environmental, Inc.

Date 7/10/02

Mark Shifflett, Quality Assurance Manager
Waterstone Environmental, Inc.

Date 7/10/02

Narciso A. Ancog, Quality Assurance Officer
Naval Facilities Engineering Command, SWDIV

Date 7/11/02

TABLE 1
BEC- OIL ISLAND, SEAL BEACH, CA
GROUND WATER MONITORING
EPA QA/R-5 QAPP ELEMENTS

U.S. EPA QA/R-5 QAPP ELEMENT		QAPP	
A1	Title and Approval Sheet	Title and Approval Sheet	
A2	Table of Contents	Table of Contents	
A3	Distribution List	Distribution List	
A4	Project/Task Organization	1.4	Project Organization
A5	Problem Definition/Background	1.1	Problem Definition and Background
A6	Project/Task Description	1.2	Project Description
A7	Quality Objectives and Criteria	1.3	Quality Objectives and Criteria
A8	Special Training/Certification	1.5	Special Training and Certification
A9	Documents and Records	1.6	Documents and Records
B1	Sampling Process Design	2.1	Sampling Process Design
B2	Sampling Methods	2.2	Sampling Methods
B3	Sample Handling and Custody	2.3	Sample Handling and Custody
B4	Analytical Methods	2.4	Analytical Methods
B5	Quality Control	2.5	Quality Control
B6	Instrument/Equipment Testing, Inspection, and Maintenance	2.6	Equipment Testing, Inspection, and Maintenance
B7	Instrument/Equipment Calibration and Frequency	2.7	Instrument Calibration and Frequency
B8	Inspection/Acceptance of Supplies and Consumables	2.8	Inspection and Acceptance of Supplies and Consumables
B9	Non-direct Measurements	2.9	Non-Direct Measurements
B10	Data Management	2.10	Data Management
C1	Assessment and Response Actions	3.1	Assessment and Response Actions
C2	Reports to Management	3.2	Reports to Management
D1	Data Review, Verification, and Validation	4.1	Data Review, Verification, and Validation
D2	Validation and Verification Methods		
D3	Reconciliation with User Requirements	4.2	Reconciliation with User Requirements

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Table

ACRONYMS AND ABBREVIATIONS

A2LA	American Association for Laboratory Accreditation
ASTM	American Society for Testing and Materials
°C	Degrees Celsius
CFR	Code of Federal Regulations
CLP	Contract laboratory program
CPR	Cardiopulmonary resuscitation
DHS	Department of Health Services
DQA	Data quality assessment
DQO	Data quality objective
EDD	Electronic data deliverable
ELAP	Environmental Laboratory Accreditation Program
EPA	U.S. Environmental Protection Agency
FSP	Field sampling plan
FTL	Field team leader
GIS	Geographic information system
HSP	Health and safety plan
ID	Identification
IDL	Instrument detection limit
LCS	Laboratory control spike
LIMS	Laboratory information management system
MCAWW	Methods for Chemical Analysis of Water and Waste
MDL	Method detection limit
MS	Matrix spike
MSD	Matrix spike duplicate
MSR	Monthly status report
NFESC	Naval Facilities Engineering Service Center
OHSC	On-site health and safety coordinator
OSHA	Occupational Safety and Health Administration
PARCC	Precision, accuracy, representativeness, completeness, and comparability
PT	Proficiency testing
QA	Quality assurance
QA QC	Quality assurance and quality control
QAO	Quality assurance officer
QAPP	Quality assurance project plan
QC	Quality control
QCSR	Quality control summary report
RDL	Required detection limit
RPD	Relative percent difference
RPM	Remedial project manager

ACRONYMS AND ABBREVIATIONS (Continued)

SDG	Sample delivery group
SOP	Standard operating procedure
SOW	Statement of work
SWDIV	Naval Facilities Engineering Command Southwest Division
TSA	Technical systems audit

1.0 PROJECT DESCRIPTION AND MANAGEMENT

On behalf of BreitBurn Energy Company (BEC), Waterstone Environmental, Inc. ("Waterstone") has prepared this *Quality Assurance Project Plan* ("QAPP") for ground water monitoring activities to be performed at BEC Oil Island located in Seal Beach, California (Subject Property) The activities will be performed at the Subject Property by Waterstone on behalf of BEC.

BEC is the operator on Oil Island Waterstone Environmental, Inc. is BEC's environmental consultant. Waterstone will subcontract with BBC Environmental of Oceanside, CA to perform water sampling according to the protocols described within this document Water samples will be shipped via overnight delivery to Fruit Growers Laboratory, Environmental and Agricultural Chemists, PO Box 272 / 853 Corporation Street, Santa Paula, CA 93061-0272. Disposal of waste materials will be performed by Cameron Environmental, Inc., 527 Van Ness Avenue, Torrance, CA 90501 (800-869-4234 contact Greg Myers).

Table 1 follows the approval page at the beginning of this QAPP. The table demonstrates how this QAPP addresses all QAPP elements currently required by the U.S. Environmental Protection Agency (EPA) QA/R-5 guidance document (EPA 2001).

In this document. tables and figures follow the first reference in the text Appendix A contains Method, Precision and Accuracy Goals. Appendix B contains Standard Operating Procedures, Appendix C contains all Field Forms, Appendix D lists Project Required Detection Limits and Background/Action Levels, Appendix E contains Approved Laboratories, Appendix F contains November 15. 1999 Workplan for Oil Island, Prepared by Kennedy Jenks Consultants and January 13, 2000 Revision 1., and Appendix G contains Comments Provided by Reviewers

1.1 PROBLEM DEFINITION AND BACKGROUND

This section describes the following:

- Purpose of the Investigation (Section 1.1 1)
- Problem to be Solved (Section 1 1 2)
- Facility Background (Section 1.1 3)
- Site Description (Section 1.1 4)
- Physical Setting (Section 1.1.5)
- Summary of Previous Investigations (Section 1.1.6)
- Principal Decision Makers (Section 1.1.7)
- Technical or Regulatory Standards (Section 1 1 8)

1.1.1 Purpose of the Investigation

The purpose of field activities at Oil Island is to:

- Conduct additional groundwater sampling and analysis to confirm previous groundwater data and determine whether elevated gross alpha and gross beta are manmade or naturally occurring
- Gather additional data to evaluate whether the bottom of the lagoons is in communication with surrounding tidally influenced surface water

The field sampling activities proposed within this QAPP will be conducted in August 2002.

1.1.2 Problem to be Solved

Previous investigations at Oil Island indicate that metals are among the potential chemicals of concern in pond sediment and that previous gross alpha and beta concentrations require additional analysis. Additional groundwater samples must be collected, analyzed and compared to prior results to determine whether gross alpha and beta are naturally occurring or manmade and whether metals in groundwater exist at levels above background.

1.1.3 Facility Background

In 1985, the Naval Energy and Environmental Support Activity (NEESA), now Naval Facilities Engineering Services Center (NFESC), conducted a preliminary assessment (then called an "Initial Assessment Study") for the Naval Weapons Station (NAVWPNSTA) Seal Beach. This report identified 25 sites, including Oil Island, that warranted further investigation. From 1988-1990, Roy F. Weston, under contract to SWDIV, conducted a Site Inspection at Oil Island which collected soil, sediment, and groundwater samples and recommended the site be further studied under a Remedial Investigation (RI).

Three groundwater monitoring wells are installed at Oil Island (see Figures 1 and 2). Groundwater sampling was last performed on the site in May 1995. It is proposed that additional groundwater monitoring be performed. To achieve representative samples, it will be necessary to re-develop the existing groundwater monitoring wells.

1.1.4 Site Descriptions

Oil Island is located on a man-made island constructed from imported fill material. Oil production has been performed at this location from the 1960's to the present. Oil production activities are projected to continue for a period of decades into the future.

1.1.5 Physical Setting

Shallow groundwater exists between 5 and 8 feet below ground surface. Lithology is predominantly silty fill material with some sandy silt to approximately 6 feet below ground surface. A previous study by Kennedy Jenks dated August 5, 1998 (*Interim Investigation Oil Island)* indicates that fill material is from a quarry located on the Palos Verde peninsula. Groundwater appears to respond to tidal fluctuations, therefore, there is no predominant groundwater flow direction beneath Oil Island.

Figure 1 is a detailed site map that shows Oil Island's location relative to surrounding land use, public roads and access. Figure 2 is a plot plan of Oil Island showing the location of lagoons, existing groundwater monitoring wells and other features of the current Oil Island operations

1.1.6 Summary of Previous Investigations

The RI report, dated December 1995 with a revision dated November 1997, was prepared by CH2M HILL. The RI report documents and summarizes the results of the RI conducted at several sites within the NAVWPNSTA including Oil Island. The RI report described the results of the investigation performed on Oil Island including analytical results for:

- 16 soil samples collected from 7 boring locations within the lagoon areas of Oil Island,
- 35 soil samples collected from 14 boring locations outside lagoon areas of Oil Island,
- 5 sediment samples collected from 5 locations outside Oil Island
- 5 sediment samples collected from background stratum at Oil Island
- 3 episodes of groundwater sampling from three groundwater monitoring wells installed during the RI.

Sampling results for Oil Island are summarized in the RI on the following tables included in the RI document:

- **Table 7-18**: Concentrations of Inorganic Chemicals of Potential Concern in Soils – Oil Island
- **Table 7-19**: Concentrations of Organic Chemicals of Potential Concern in Soils - Oil Island
- **Table 7-20**: Concentrations of Organic & Inorganic Chemicals of Potential Concern in Sediments – Oil Island
- **Table 7-21**: Concentrations of Organic & Inorganic Chemicals of Potential Concern in Groundwater – Oil Island
- **Table F-4**: Soil Results – Oil Island (A summary of all analytical results for Oil Island).

1.1.7 Principal Decision Makers

Principal decision makers include BEC, the Navy, regulatory agencies, and the general public. Data will be used guide possible future investigations

1.1.8 Technical or Regulatory Standards

Project specific background/action levels have been established for use in evaluating whether groundwater impact exists at Oil Island. These project background/action levels have been listed in Appendix D for comparison to the project required detection limits (RDLs) selected for this investigation.

1.2 PROJECT DESCRIPTION

The following subsections discuss the objectives and measurements of the project. Table 2 presents a schedule of sampling, analysis, and reporting for Oil Island activities.

1.2.1 Project Objectives

As stated in Section 1.1.2, the primary objective of activities at Oil Island is to collect and analyze additional groundwater samples, then compare to prior results in order to determine whether gross alpha and beta are naturally occurring or manmade and whether metals in groundwater exist at levels above background concentrations.

In order to meet these objectives, the following field activities will be carried out at Oil Island under this project:

- Re-develop the three existing onsite groundwater monitoring wells.
- Collect groundwater samples from each of the three re-developed groundwater monitoring wells.

1.2.2 Project Measurements

Groundwater samples will be collected from each of the three groundwater monitoring wells at Oil Island. All groundwater samples will be analyzed for:

- Gross alpha/beta (EPA Method 900.0 or 0-02)
- Radium-226 (EPA 903.1)
- Radium-228 (EPA 904.0)
- Total Uranium (EPA Method 908.0 or alpha spectroscopy)
- Radon (SM 7500-Rn or equivalent) (only run on unfiltered sample)
- Gamma emitters (EPA 901.1)
- metals.

TABLE 2

BEC OIL ISLAND
FIELD ACTIVITIES
IMPLEMENTATION SCHEDULE FOR SAMPLING, ANALYSIS, AND REPORTING

Task	Start Date	End Date	Duration[a]
Internal Draft QAPP	2nd Draft	June 12, 2002	--
Navy review	June 12, 2002	July 12, 2002	1 month
Address comments, Draft QAPP	July 12, 2002	July 31, 2002	2.5 weeks
Regulatory review	July 12, 2002	August 8, 2002	3 weeks
Final QAPP	July 12. 2002	July 31, 2002	2.5 weeks
Conduct field sampling	August 8, 2002	August 16, 2002	1 week
Receive all analytical data (14 day turnaround)	August 16, 2002	September 2, 2002	2 weeks
Review all chemical data	September 2. 2002	September 16. 2002	2 weeks
Analytical data validation	September 16. 2002	September 23, 2002	1 week
Evaluate data and prepare report	September 23. 2002	October 23. 2002	1 month

Note:

[a] Duration in calendar weeks/months

1.3 QUALITY OBJECTIVES AND CRITERIA

The following sections present the data quality objectives (DQOs) and quality assurance (QA) objectives identified for the proposed field activities at Oil Island

1.3.1 Data Quality Objectives

DQOs are qualitative and quantitative statements developed through the seven-step DQO process (EPA 2000b, 2000d). The DQOs clarify the study objective, define the most appropriate data to collect and the conditions under which to collect the data, and specify tolerable limits on decision errors that will be used as the basis for establishing the quantity and quality of data needed to support decision-making The DQOs are used to develop a scientific and resource-effective design for data collection. The seven steps of the DQO process for this project are presented in Table 3.

1.3.2 Project Quality Assurance Objectives

All analytical results will be evaluated in accordance with precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters to ensure the attainment of project specific DQOs. Of these PARCC parameters, precision and accuracy will be evaluated quantitatively through the collection of the quality control (QC) samples listed in Table 4 Precision and accuracy goals for these QC samples are listed in Appendix A.

The subsections below detail the objectives relating to each of the PARCC parameters.

TABLE 3

BEC OIL ISLAND
FIELD ACTIVITIES
DATA QUALITY OBJECTIVES

STEP 1: State the Problem
• Previous sampling at Oil Island has shown that metals are among the potential chemicals of concern in pond sediment and that previous gross alpha and beta results require further analysis.
STEP 2: Identify the Decisions
• Are the levels of gross alpha and beta naturally occurring? • Do the concentrations of metals in groundwater exceed background levels? • Is the bottom of the lagoons in communication with surrounding tidally influenced saltmarsh water to the extent that materials in the bottom of the lagoons could impact the surrounding water?
STEP 3: Identify Inputs to the Decisions
• Groundwater collected from three monitoring wells at Oil Island. • Results from groundwater samples collected at Oil Island during previous investigations. • Geological and hydrogeological data associated with Oil Island. • Background action levels of potential chemicals of concern.
STEP 4: Define Study Boundaries
• Samples will be collected from three existing groundwater monitoring wells on Oil Island • Temporal boundaries extend through the period of performance.
STEP 5: Develop Decision Rules
• If gross alpha/beta concentrations detected in groundwater <u>are not</u> comparable with data previously collected for Oil Island or with other available information regarding metals and radioactive parameters on the Naval Weapons Station, then additional actions will be evaluated and a preferred option will be selected. If gross alpha/beta concentrations detected in groundwater <u>are</u> comparable with data previously collected for Oil Island or with other available information regarding metals and radioactive parameters on the Naval Weapons Station, then the groundwater sampling investigation will be considered complete • If metals concentrations detected in groundwater <u>are not</u> comparable with data previously collected for Oil Island or with other available information regarding metals and radioactive parameters on the Naval Weapons Station, then additional actions will be evaluated and a preferred option will be selected. If metals concentrations detected in groundwater <u>are</u> comparable with data previously collected for Oil Island or with other available information regarding metals and radioactive parameters on the Naval Weapons Station, then the groundwater sampling investigation will be considered complete. • If the bottom of the lagoons appear to be in communication with tidally influenced saltmarsh water, data will be used to determine the amount of time the communication occurs during the year and the potential for water impounded in the lagoons (if any) to seep through the ponds. This data will be evaluated to determine whether the material in the bottom of the lagoons has the potential to impact surrounding saltmarsh water. If the data determine there is no communication between lagoon bottoms and saltmarsh water, the investigation will be considered complete. If the data determine there is communication which may impact surrounding saltmarsh water, then additional actions will be evaluated and a preferred option will be selected

STEP 6: Specify Tolerable Limits on Decision Errors
• The null hypothesis is that gross alpha and beta and metals concentrations have not been detected on Oil Island at concentrations that require further investigation • A false positive is defined as anamalously high gross alpha and beta or metals which, in fact, are not explainable by or consistent with prior site uses and previous data If the false positive is deemed erroneous, additional sampling may result to correct the erroneous conclusion. • Statistical sampling is not being used but judgmental sampling will be performed.
STEP 7: Optimize the Sampling Design
• Locations selected for groundwater sampling are based on historical operations. • The number of samples collected is considered reasonable for the existing monitoring wells

1.3.2.1 Precision

Precision is the degree of mutual agreement between individual measurements of the same property under similar conditions. Combined field and laboratory precision is evaluated by collecting and analyzing field duplicates and then calculating the variance between the samples, typically as a relative percent difference (RPD)

$$RPD = \frac{|A-B|}{(A+B)/2} \times 100\%$$

where: A = first duplicate concentration
B = second duplicate concentration

For this project, one field duplicate will be collected from one of the three onsite monitoring wells. The goal for precision has been set at 50 percent RPD

Laboratory analytical precision is evaluated by analyzing matrix spikes (MS) and matrix spike duplicates (MSD). For this project, MS MSD samples will be generated for all analyses of groundwater samples. The results of the analysis of each MS/MSD pair will be used to calculate an RPD for evaluating precision.

1.3.2.2 Accuracy

Accuracy is the degree of agreement between an analytical measurement and a reference accepted as a true value. The accuracy of a measurement system can be affected by errors introduced by field contamination, sample preservation, sample handling, sample preparation, and analytical techniques. A program of sample spiking will be conducted to evaluate laboratory accuracy. This program includes analysis of the MS and MSD samples, laboratory control spikes (LCS) or blank spikes, and method blanks. MS and MSD samples will be prepared and analyzed at a frequency of one set per sampling event (one set for every three samples collected). LCSs or blank spikes are also prepared and analyzed with each analytical batch. The results of the spiked samples are used to calculate the percent recovery for evaluating accuracy.

TABLE 4

BEC- OIL ISLAND
FIELD ACTIVITIES
QUALITY CONTROL SAMPLES FOR PRECISION AND ACCURACY

QC TYPE	Precision	Accuracy	Frequency
Field QC	Field duplicate RPD	Field Blanks Equipment Rinsate	Field Duplicate = 1/10 samples Field Blank = 1/10 samples Equipment Rinsate = 1/day/piece of equipment
Laboratory QC	MS/MSD RPD Field Duplicate RPD	MS/MSD %R Method Blanks LCS or Blank Spikes	MS/MSD = 1 set per 10 samples Method Blank = 1 analytical batch (3 samples) LCS or Blank Spikes = 1 analytical batch Field duplicate = 1/sampling event

Notes:

%R	Percent recovery
LCS	Laboratory control sample
MS/MSD	Matrix spike matrix spike duplicate
RPD	Relative percent difference

$$\text{Percent Recovery} = \frac{S - C}{T} \times 100$$

where S = Measured spike sample concentration
C = Sample concentration
T = True or actual concentration of the spike

Appendix A presents accuracy goals for the Oil Island groundwater monitoring activities based on the percent recovery of matrix spikes Results that fall outside the accuracy goals will be further evaluated on the basis of other QC samples

1.3.2.3 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represent the characteristics of a population, variations in a parameter at a sampling point or an environmental condition that they are intended to represent. For this project, representative data will be obtained through careful selection of sampling locations and analytical parameters. Representative data will also be obtained through proper collection and handling of samples to avoid interference and minimize contamination.

Representativeness of data will also be ensured through established field and laboratory procedures and their consistent application. To aid in evaluating of the representativeness of the sample results, field and laboratory blank samples, and background samples will be evaluated for the presence of contaminants Data determined to be nonrepresentative, by comparison with existing data, will be used only if accompanied by appropriate qualifiers and limits of uncertainty

1.3.2.4 Completeness

Completeness is a measure of the percentage of project-specific data that are valid Valid data are obtained when samples are collected and analyzed in accordance with QC procedures outlined in this QAPP, and when none of the QC criteria that affect data usability are exceeded. When all data validation is completed, the percent completeness value will be calculated by dividing the number of useable sample results by the total number of sample results planned for this investigation.

As discussed further in Section 4.2, completeness will also be evaluated as part of the data quality assessment process (EPA 2000c). This evaluation will help determine whether any limitations are associated with the decisions to be made based on the data collected

1.3.2.5 Comparability

Comparability expresses the confidence with which one data set can be compared with another. Comparability of data will be achieved by consistently following standard field and laboratory procedures and by using standard measurement units in reporting analytical data. Analytical methods selected for this monitoring project are consistent with the methods used during previous monitoring activities at Oil Island.

1.3.2.6 Detection and Quantitation Limits

The method detection limit (MDL) is the minimum concentration of an analyte that can be reliably distinguished from background noise for a specific analytical method. The quantitation limit represents the lowest concentration of an analyte that can be accurately and reproducibly quantified in a given sample matrix. Project required detection limits (RDLs) are contractually specified maximum quantitation limits for the sample matrix, and are typically several times the MDL to allow for matrix effects. RDLs are set liberally to establish minimum criteria for laboratory performance; actual laboratory quantitation limits may be substantially lower

Appendix D contains a comparison of the RDLs for the selected analytical methods in comparison to the project action level. The purpose of this comparison is to show that the selected analytical methods, and associated RDLs, are capable of quantifying contaminants of concern at or below the applicable action level. In comparing the RDLs to action level, however, it is important to note that actual laboratory quantitation limits may be lower than RDLs and that estimates of analyte concentrations down to MDLs can typically be provided in order to allow comparisons to screening levels that are below RDLs

For this project, samples analyzed for metals and gross alpha and beta will be reported as estimated values if concentrations are less than RDLs but greater than MDLs. The MDL for each analyte will be listed as the detection limit in the laboratory's electronic data deliverable (EDD). This procedure is being adopted to help ensure that effective comparisons of analyte results to background action levels can be performed for certain analytes where the RDL is near

or below the background/action level and to ensure that subsequent statistical evaluations of the data will not be biased by high-value nondetect results.

1.4 PROJECT ORGANIZATION

Table 5 presents the responsibilities and contact information for key personnel involved in groundwater sampling at Oil Island. In some cases, more than one responsibility has been assigned to a person. Figure 3 presents the organization of the project team.

1.5 SPECIAL TRAINING AND CERTIFICATION

This section outlines the training and certification required to complete the activities described in this QAPP. The following sections describe the requirements for Waterstone and subcontractor personnel working on site.

1.5.1 Health and Safety Training

Waterstone personnel who work at hazardous waste project sites are required to meet the Occupational Safety and Health Administration (OSHA) training requirements defined in Title 29 Code of Federal Regulations (29 CFR) Part 1910.120(e). These requirements include: (1) 40 hours of formal off-site instruction; (2) a minimum of 3 days of actual on-site field experience under the supervision of a trained and experienced field supervisor; and (3) 8 hours of annual refresher training.

TABLE 5

BEC - OIL ISLAND
FIELD ACTIVITIES
KEY PERSONNEL

Name	Organization	Role	Responsibilities	Contact Information
Si Le	Navy	Remedial project manager	Responsible for overall project execution and for coordination with base representatives, regulatory agencies, and Navy management Actively participates in DQO process Provides management and technical oversight during data collection	Naval Facilities Engineering Command
Narciso A Ancog	Navy	QA officer	Responsible for QA issues for all Navy CLEAN work	Naval Facilities Engineering Command, San Diego, CA ancogna@efdsw.navfac.navy.mil

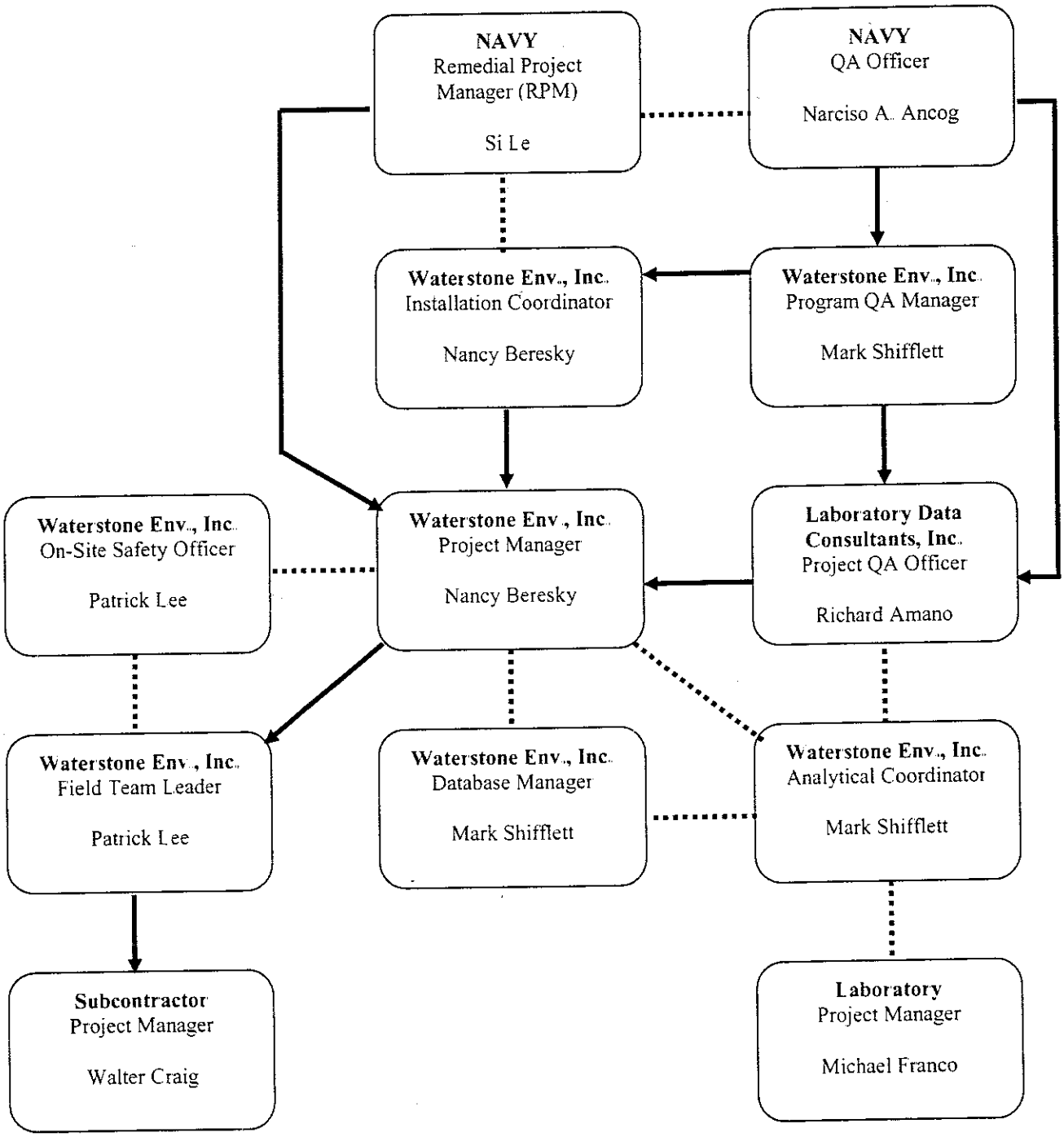
Name	Organization	Role	Responsibilities	Contact Information
			Provides landlord oversight of Waterstone Environmental's QA program Reviews and approves QAPP and any significant modifications Has authority to suspend project activities if Navy quality requirements are not met	(619) 532-2540
Nancy Beresky	Waterstone	Installation coordinator	Responsible for ensuring that all Waterstone Environmental, Inc activities at this installation are carried out in accordance with current Navy guidance and Waterstone Environmental, Inc. program guidance	Waterstone Environmental, Inc. Anaheim, CA nberesky@waterstone-env.com (714) 414-1122
Nancy Beresky	Waterstone	Project manager	Responsible for implementing all activities at Oil Island Prepares or supervises preparation of QAPP and approves document Monitors and directs field activities to ensure compliance with QAPP requirements	Waterstone Environmental, Inc. Anaheim, CA nberesky@waterstone-env.com (714) 414-1122
Mark Shifflett	Waterstone	Program QA manager	Responsible for regular discussion and resolution of QA issues with Navy QA officer Provides program-level QA guidance to installation coordinator, project manager, and project teams Reviews and approves QAPPs Identifies nonconformances through audits and other QA review activities and recommends corrective action	Waterstone Environmental, Inc Anaheim, CA mshifflett@waterstone-env.com (714) 414-1122
Richard Amano	QA Consultant	Project QA officer	Responsible for providing guidance to project teams preparing QAPPs Verifies that data collection methods specified in QAPP comply Navy and	Laboratory Data Consultants, Inc. Carlsbad, CA ramano@lab-data.com (760) 634-0437

Name	Organization	Role	Responsibilities	Contact Information
			Waterstone Environmental, Inc requirements May conduct laboratory evaluations and audits	
Patrick Lee	Waterstone	Field team leader	Responsible for directing day-to-day field activities conducted by Waterstone Environmental, Inc. and subcontractor personnel Verifies that field sampling and measurement procedures follow QAPP Provides project manager with regular reports on status of field activities	Waterstone Environmental, Inc Anaheim, CA plee@waterstone-env com (714) 414-1122
Patrick Lee	Waterstone	On-site safety officer	Responsible for implementing health and safety plan and for determining appropriate site control measures and personal protection levels Conducts safety briefings for Waterstone Environmental. Inc and subcontractor personnel and site visitors Can suspend operations that threaten health and safety	Waterstone Environmental, Inc. Anaheim. CA (714) 414-1122
Mark Shifflett	Waterstone	Analytical coordinator	Responsible for working with project team to define analytical requirements Assists in selecting a pre-qualified laboratory to complete required analyses (see Section 2 4 of QAPP) Coordinates with laboratory project manager on analytical requirements. delivery schedules. and logistics Reviews laboratory data before release to project team	Waterstone Environmental. Inc Anaheim. CA mshifflett@waterstone-env.com (714) 414-1122
Michael Franco	Laboratory	Project manager	Responsible for delivering analytical services that meet QAPP requirements Reviews QAPP to understand analytical requirements	Fruit Growers Laboratory. Environmental and Agricultural Chemists. Santa Paula. CA Email: mfranco@fglinc.com Phone: 805-659-0910

Name	Organization	Role	Responsibilities	Contact Information
			Works with Waterstone Environmental, Inc. analytical coordinator to confirm sample delivery schedules Reviews laboratory data package before delivery to Waterstone Environmental, Inc.	

FIGURE 3

PROJECT TEAM ORGANIZATION CHART



At least one member of every Waterstone field team will maintain current certification in the American Red Cross "Multimedia First Aid" and "Cardiopulmonary Resuscitation (CPR) Modular," or equivalent.

Copies of Waterstone's health and safety training records, including course completion certifications for the initial and refresher health and safety training, specialized supervisor training, and first aid and CPR training, are maintained in Waterstone's offices.

Before work begins at a specific hazardous waste project site, Waterstone personnel are required to undergo site-specific training that thoroughly covers the following areas:

- Names of personnel and alternates responsible for health and safety at a hazardous waste project site
- Health and safety hazards present on site
- Selection of the appropriate personal protection levels
- Correct use of PPE
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment on site
- Medical surveillance requirements, including recognition of symptoms and signs that might indicate overexposure to hazardous substances
- Waterstone's health and safety plan (HSP)

1.5.2 Subcontractor Training

Subcontractors who work on hazardous waste project sites will certify that their employees have been trained for work on hazardous waste project sites. Training will meet OSHA requirements defined in 29 CFR 1910 120(e). Before work begins at the project site, subcontractors will submit copies of the training certification for each employee to Waterstone.

All employees of associate and professional services firms and technical services subcontractors will attend a safety briefing and complete the "Safety Meeting Sign-Off Sheet" before conducting on-site work. This briefing covers the topics described in Section 1.5.1 and is conducted by the Waterstone on-site health and safety coordinator (OHSC) or other qualified person.

1.6 DOCUMENTS AND RECORDS

Documentation is critical for evaluating the success of any environmental data collection activity. The following sections discuss the requirements for documenting field activities and for preparing laboratory reports. This section also describes reports that will be generated as a result of the groundwater monitoring activities at Oil Island.

1.6.1 Field Documentation

Complete and accurate documentation is essential to demonstrate that field measurement and sampling procedures are carried out as described in the QAPP. Field personnel will use field logbooks to record and document field activities The logbook will list the contract name and number, the site name, and the names of subcontractors, the client, and the project manager. At a minimum, the following information will be recorded in the field logbook:

- Name and affiliation of all on-site personnel or visitors
- Weather conditions during the field activity
- Summary of daily activities and significant events
- Notes of conversations with coordinating officials
- References to other field logbooks or forms that contain specific information
- Discussions of problems encountered and their resolution
- Discussions of deviations from the QAPP or other governing documents
- Description of all photographs taken

The field team will also use the various field forms included in Appendix C to record field activities

1.6.2 Summary Data Package

Laboratory subcontractors will prepare summary data packages in accordance with the instructions provided in the EPA Contract Laboratory Program (CLP) statements of work (SOW) (EPA 1999a, 2000a) The summary data package will consist of a case narrative, copies of all associated chain-of-custody forms, sample results, and quality assurance and quality control (QA QC) summaries. The case narrative will include the following information:

- Subcontractor name, project name, project number, sample delivery group (SDG) number, and a table that cross-references client and laboratory sample identification numbers (ID)
- Detailed documentation of all sample shipping and receiving, preparation, analytical, and quality deficiencies, including analyses performed without an American Association for Laboratory Accreditation (A2LA)-certified standard
- Thorough explanation of all instances of manual integration
- Copies of all associated nonconformance and corrective action forms that will describe the nature of the deficiency and the corrective action taken
- Copies of all associated sample receipt notices

Additional summary data package requirements are outlined in Table 6 Laboratory subcontractors will provide Waterstone with two copies of the summary data package within 28 days after they receive the last sample in the SDG.

1.6.3 Full Data Package

When a full data package is required, the laboratory subcontractors will prepare data packages in accordance with the instructions provided in the EPA CLP statements of work (EPA 1999a, 2000a). Full data packages will contain all of the information from the summary data package and all associated raw data. Full data package requirements are outlined in Table 6. Full data packages are due to Waterstone within 35 days after the last sample in the SDG is received. Unless otherwise requested, the subcontractor will deliver one copy of the full data package.

TABLE 6

BEC - OIL ISLAND
PHASE III FIELD ACTIVITIES
REQUIREMENTS FOR SUMMARY AND FULL DATA PACKAGES

Requirements for Summary Data Packages – Inorganic Analysis
Section I **Case Narrative**
1. Case narrative
2. Copies of nonconformance and corrective action forms
3. Chain-of-custody forms
4. Copies of sample receipt notices
5. Internal tracking documents, as applicable
Section II **Sample Results - Form I for the following:**
1. Environmental sample including dilutions and re-analysis
Section III **QA/QC Summaries - Forms II through XIV for the following:**
1. Initial and continuing calibration verifications (Form II)
2. RDL standard (Form II)
3. Detection limit standard (Form II-Z)
4. Method blanks, continuing calibration blanks, and preparation blanks (Form III)
5. Inductively coupled plasma (ICP) interference-check samples (Form IV)
6. MS and post-digestion spikes (Forms V and V-Z)
7. Sample duplicates (Form VI)
8. LCSs (Form VII)
9. Method of standard additions (Form VIII)
10. ICP serial dilution (Form IX)
11. IDL (Form X)
12. ICP interelement correction factors (Form XI)
13. ICP linear working range (Form XII)
Sections I, II, III **Summary Package**
Section IV **Instrument Raw Data - Sequential measurement readout records for ICP, graphite furnace atomic absorption (GFAA), flame atomic absorption (AA), and other inorganic analyses, which will contain the following information:**
1. Environmental samples, including dilutions and re-analysis
2. Initial calibration
3. Initial and continuing calibration verifications
4. Detection limit standards
5. Method blanks, continuing calibration blanks, and preparation blanks
6. ICP interference check samples
7. MS and post-digestion spikes
8. Sample duplicates
9. LCSs

Requirements for Summary Data Packages – Inorganic Analysis
10. Method of standard additions
11. ICP serial dilution
Section V Other Raw Data
1. Sample digestion, distillation, and preparation logs, as necessary
2. Instrument analysis log for each instrument used
3 Standard preparation logs, including initial and final concentrations for each standard used
4. Formula and a sample calculation for the initial calibration
5. Formula and a sample calculation for groundwater sample results

1.6.4 Data Package Format

Where a significant amount of data is generated, EDDs are generated for all sample results An automated laboratory information management system (LIMS) will be used to produce the EDD. Manual creation of the deliverable (data entry by hand) is unacceptable. The laboratory will verify EDDs internally before they are issued. The EDD will correspond exactly to the hard-copy data. No duplicate data will be submitted EDDs will be delivered in a format compatible with Waterstone's database Results that should be included in all EDDs are as follows:

- Target analyte results for each sample and associated analytical methods requested on the chain-of-custody form
- Method and instrument blanks and preparation and calibration blank results reported for the SDG
- Percent recoveries for spiked analytes in the MS, MSDs, blank spikes. or LCSs
- Matrix duplicate results reported for the SDG
- All re-analysis. re-extractions. or dilutions reported for the SDG, including those associated with samples and the specified laboratory QC samples

Electronic and hard copy data must be retained for a minimum of 3 and 10 years, respectively, after final data have been submitted. The subcontractor will use an electronic storage device capable of recording data for long-term, off-line storage Raw data will be retained on an electronic data archival system.

1.6.5 Reports Generated

A technical report for Oil Island groundwater monitoring activities will be prepared at the conclusion of the field work. The report will include a summary of the results from current activities as well as previous related investigations. field and sampling procedures for the groundwater monitoring activities. and recommendations for the site The report will contain tables and figures summarizing analytical results and sampling locations. Laboratory reports will be provided as an appendix to the report

2.0 DATA GENERATION AND ACQUISITION

This section describes the requirements for the following:

- Sampling Process Design (Section 2.1)
- Sampling Methods (Section 2.2)
- Sample Handling and Custody (Section 2.3)
- Analytical Methods (Section 2.4)
- Quality Control (Section 2.5)
- Equipment Testing, Inspection, and Maintenance (Section 2.6)
- Instrument Calibration and Frequency (Section 2.7)
- Inspection and Acceptance of Supplies and Consumables (Section 2.8)
- Non-direct Measurements (Section 2.9)
- Data Management (Section 2.10)

2.1 SAMPLING PROCESS DESIGN

The groundwater samples collected from the Oil Island field effort will provide (1) the information needed to further characterize the concentration of metals at Oil Island, and (2) the information that will be used to help evaluate whether gross alpha and beta are naturally occurring or manmade at Oil Island. The following subsections present the proposed sample locations and planned chemical analyses. Section 2.1.3 also includes information on re-development of monitoring wells.

2.1.1 Groundwater Monitoring Activities - Oil Island

Waterstone anticipates collecting one sample at each of the three Oil Island groundwater monitoring wells. The groundwater samples will be submitted for analysis of metals, wet chemistry and radiochemistry analyses. Samples for chemical analysis will be submitted to a California state-certified laboratory that has been approved by the Navy for radioactive, metals, and general parameters analysis. Table 7 summarizes the proposed analyses, analytical methods, and QC samples for the groundwater samples collected at Oil Island.

2.1.2 Rationale for Selecting Analytical Parameters

As stated in Section 1.1.2, a review of analytical data generated during previous monitoring activities at Oil Island indicate that metals are among the chemicals of concern in pond sediment and that previous gross alpha and beta require further analysis.

TABLE 7

BEC - OIL ISLAND
FIELD ACTIVITIES
SUMMARY OF GROUNDWATER ANALYSES

Parameter	Matrix	Field Samples	Field Blank	Equipment Rinsate	Field Duplicate (1 per SE) [a]	Total Number of Samples	MS/MSD (1 per SE) [b]
Metals	Aqueous	3	1	1	1	6	1
Alkalinity	Aqueous	3	1	1	1	6	1
Chloride, Sulfate	Aqueous	3	1	1	1	6	1
pH	Aqueous	3	1	1	1	6	Not Applicable
Specific Conductivity	Aqueous	3	1	1	1	6	Not Applicable
Total Dissolved Solids	Aqueous	3	1	1	1	6	Not Applicable
Gross Alpha/Beta	Aqueous	3	1	1	1	6	Not Applicable
Total Radium Screen	Aqueous	3	1	1	1	6	1
Total Uranium Screen	Aqueous	3	1	1	1	6	1
Radon	Aqueous	3	1	1	1	6	1
Gamma Emitters	Aqueous	3	1	1	1	6	Not Applicable

Notes:

[a] One field duplicate and one MS/MSD will be collected per sampling event (SE).
[a] Matrix spike and matrix spike duplicates are not considered additional samples.

2.1.3 Re-development of Monitoring Wells

Well development procedures are implemented to settle the filter pack and remove fine material which may have migrated from the formation into the well. Development includes the removal of groundwater from the well using standard surging and bailing techniques

The depth to water and the total depth of the well are measured prior to development with a water sounder to the nearest 0.01 foot. Prior to the removal of groundwater, the volume of water in one casing volume and 10 casing volumes are calculated.

Surging is performed using a clean, hand-held bailer or a bailer or appropriately-sized surge block lowered down the well by a SMEAL 5-T Development Rig or equivalent equipment. The wells are gently surged to force groundwater to flow into and out of the well screen and allow fine-grained sediments to break up, go into suspension, and then migrate into the groundwater standing in the well bore. The wells are then bailed with a clean stainless steel, teflon, or PVC bailer to remove silts and clays which have migrated into the well bore. Turbid groundwater is removed from the well during well development and groundwater representative of the formation collects inside the well.

During development, water pH, electric conductivity (EC), and temperature are monitored at least once for every casing volume removed. If pH, EC, and temperature readings stabilize prior to the removal of 10 casing volumes, less water may be developed from the well. A minimum of 3 and maximum of 10 casing volumes is removed during well development. Development may continue until water temperature, pH and EC have stabilized and the water is visibly clear

Methods of well development such as disposable, hand-held bailers or pumping devices (i.e., peristaltic, diaphragm, centrifugal, two-stage submersible or hand pumps) may be used depending on the recharge capability of the aquifer. Slowly recharging wells may be developed by removing less than 10 casing volumes from the well.

2.2 SAMPLING METHODS

This section describes the procedures for sample collection, including sampling methods and equipment, sample preservation requirements, decontamination procedures, and management of investigation derived waste

2.2.1 Sampling Methods and Equipment

Groundwater samples will be collected a minimum of 72 hours after well development. Groundwater monitoring will be performed according to the following protocols:

The depth to water and the total depth of the well is measured prior to well purging and sampling with an electronic water interface probe to the nearest 0.01 foot. Prior to the removal of groundwater, the volume of water in one casing volume and 3 casing volumes are calculated.

2.2.1.1 Purging by Bailing or Pumping

Prior to sampling a minimum of 3 casing volumes are removed from the well using a submersible pump or by hand bailing. During purging, pH, electric conductivity (EC), and temperature are monitored at least once for every casing volume removed. Purging may continue until water temperature, pH and EC have stabilized (less than 20% variance between readings) and the water is visibly clear.

The procedure for purging a well with a bailer is to lower the bailer slowly into the water until the top of the bailer is submerged just below the water surface. The bailer is withdrawn from the water slowly. This procedure eliminates a plunger effect, which might otherwise stir up accumulated sediments on the well bottom providing groundwater samples that are sediment-free. Caution is exercised, both during purging and sampling, that the bailer and the bailer rope contacting any part of the well or water within does not touch the ground surface (e.g., the bailer rope is coiled by hand or clean visqueen is laid near the wellhead to protect the sampling equipment from contacting the surface). When purging the well using a pump, the pump or intake hose is lowered in a manner so that sediments on the well bottom are not disturbed.

After purging or development, groundwater samples are collected with a disposable polyethylene bailer with stopcock, which is lowered down the well via nylon cord. All equipment (including the nylon cord) is disposed of after use in one well or if it is inadvertantly contaminated during the sampling procedure. Groundwater samples are collected within 2 hours after purging of each well.

2.2.1.2 Filtered Samples

For metals analysis; a nitric acid preservative (HNO_3) is typically required. To prevent leaching of metals from suspended solids, water samples are collected and filtered in the field. A new, disposable filtering device is used at each well location to accomplish this.

Each filtering device consists of a 0.45 micron filter between a double-chambered collection container. The collected water sample is transferred to the top chamber and a vacuum applied to draw the water through the filter. The filtered sample is then transferred from the lower chamber to the laboratory-supplied container with nitric acid preservative for metals analysis. Each filtering device is used only once and disposed of after collection of a sufficient volume of water sample from each well location. To ensure accurate results for the metals analysis, the following specific protocol is performed during sampling for metals:

- All samples for metals analysis are filtered in the field using disposable 0.45 micron filtering apparatus.

- Each sample bottle contains the exact amount of nitric acid necessary for preservative. Because nitric acid from the manufacturer may contain impurities such as various metals, ultra-pure nitric acid is used to ensure that metals concentrations are not introduced into the samples by the acid itself.

- Water samples are transferred, after filtering, into 1-liter polyethylene bottles (with preservative) for metals analysis. Samples bottles are filled in a way to ensure that the acid volume remains consistent for each sample by preventing any water overrun from the sample bottles during sample collection.

- A field blank sample is also prepared in the field and analyzed for metals. This is a sample bottle containing nitric acid preservative prepared by the lab. Distilled water is added to the bottle in the field as a measure of potential metals concentrations which are added to groundwater samples as a result of blowing dust, metals concentrations in the air, or other field parameters.

- An equipment rinseate sample is prepared in the field and analyzed for metals. This is a sample bottle containing nitric acid preservative prepared by the lab. Distilled water is added to the bottle in the field after circulation through one of the sampling bailers. This sample is analyzed for metals to determine whether metals concentrations have been added to groundwater samples as a result of contamination associated with sampling apparatus.

- One duplicate sample is collected. This duplicate sample is analyzed for metals to ensure reproducibility of data.

The same procedure is used for collecting filtered samples for gross alpha and gross beta analysis.

2.2.2 Decontamination

Pumps and pump power supply, discharge, and safety lines are washed with phosphate-free soap (Alconox (TM)® or equivalent) and potable water and triple rinsed, the last rinse is a distilled water rinse. To minimize contamination of purging and sampling equipment, a plastic sheet is placed on the ground at the base of each well prior to purging and sampling.

2.2.3 Management of Project Derived Waste

Purged groundwater and decontamination water is transferred to Department of Transportation-approved, 55-gallon drums and temporarily stored onsite pending sample analysis results. After receipt of analytical results, the proper method for disposal of the water is identified. Appropriate disposal of water from groundwater sampling activities

will be arranged with Cameron Environmental, Inc., 527 Van Ness Avenue, Torrance, CA 90501 (Contact: Greg Myers 800-869-4234)

2.2.4 Sample Containers and Holding Times

The type of sample containers to be used for each analysis, the sample volumes required, the preservation requirements, and the maximum holding times for sample extraction and analysis are presented in Table 8.

FGL Laboratories will provide the appropriate sample containers and preservative. One-liter poly bottles are used to collect groundwater samples for gross alpha/gross beta and other radioactive analysis. No preservative is required.

One-liter poly bottles are also used to collect groundwater samples for metals analysis. Samples are filtered prior to collection in sample containers or at the laboratory. Nitric acid preservative (measured at the laboratory) is used.

2.3 SAMPLE HANDLING AND CUSTODY

The following subsections describe sample handling procedures, including sample identification and labeling, documentation, chain-of-custody, and shipping.

2.3.1 Sample Identification

A unique sample identification number will be assigned to each sample collected at Oil Island. The sample numbering system allows each sample to be uniquely identified and provides a means of tracking the sample from collection through laboratory analysis and onto the final report. Each sample will be assigned a unique number or identification as follows:

- Well Number
- "F" or "U" for filtered or unfiltered
- "Dupl." for duplicate
- "Trip Blank"
- "Rinse Blank"

All samples, including duplicate and quality control samples, will be numbered in the same fashion

2.3.2 Sample Labels

A waterproof sample label will be affixed to all sample containers. The label will be provided by the laboratory and will be completed with the following information written in indelible ink:

- Project name
- Sample identification number
- Date and time of sample collection
- Preservative used
- Sample collector's initials
- Analysis required

TABLE 8

BEC - OIL ISLAND
FIELD ACTIVITIES
SAMPLE CONTAINER, HOLDING TIME, AND PRESERVATIVE REQUIREMENTS

Parameter[a]	Method Number[b]	Sample Volume	Sample Container[c]	Preservative	Holding Time[d]
Inorganic Analyses (Groundwater)					
Metals (Filtered)	EPA 6010B	1 L	HDPE	To pH < 2 with HNO_3; Cool, 4 °C	180 days
Metals (Unfiltered)	EPA 6010B	1 L	HDPE	To pH < 2 with HNO_3; Cool, 4 °C	180 days
Mercury	EPA 7421	1 L	HDPE	To pH < 2 with HNO_3; Cool, 4 °C	28 days
Alkalinity	SM 2320, Titrimetric	200 ml	HDPE	Cool, 4 °C	14 days
Chloride, Sulfate	EPA 300.0	100 ml	HDPE	Cool, 4 °C	28 days
pH	EPA 150.1	50 ml	HDPE	None Required	Analyze Immediately
Specific Conductivity	EPA 120.1	500 ml	HDPE	Cool, 4 °C	28 Days
Total Dissolved Solids	EPA 160.1	200 ml	HDPE	Cool, 4 °C	7 days
Gross Alpha/Beta	EPA 900.0 or 0-02	1 L	HDPE	None Required	6 months
Total Radium (226/228)	EPA 903.1 and 904.0	1 L	HDPE	None Required	6 months
Total Uranium Screen	EPA 908.0 or Alpha Spectroscopy	1 L	HDPE	None Required	6 months
Radon	SM 7500	1 L	HDPE	None Required	19 days
Gamma Emitters	EPA 901.1	1 L	HDPE	None Required	6 months

Notes:

[a] Unless otherwise noted, analyses will be performed on unfiltered sample.
[b] Complete method references are presented in Section 2.4
[c] Container Type: HDPE = High Density Polyethylene Bottle
[d] Maximum amount of time from sampling to analysis

°C	Degrees Celsius
EPA	U.S. Environmental Protection Agency
L	Liter
ml	Milliliter
SM	Standard Methods for the Examination of Water and Waste Water

After labeling, each sample will be refrigerated or placed in a cooler that contains ice to maintain the sample temperature at or below 4 degrees Celsius (°C)

2.3.3 Sample Documentation

Documentation during sampling is essential to ensure proper sample identification Waterstone personnel will adhere to the following general guidelines for maintaining field documentation:

- Documentation will be completed in permanent black ink
- All entries will be legible
- Errors will be corrected by crossing out with a single line and then dating and initialing the lineout
- Any serialized documents will be maintained at Waterstone and referenced in the site logbook
- Unused portions of pages will be crossed out. and each page will be signed and dated

Section 1 6.1 includes additional information on how Waterstone will use logbooks to document field activities. The Waterstone field team leader is responsible for ensuring that sampling activities are properly documented

2.3.4 Chain of Custody

Waterstone will use standard sample custody procedures to maintain and document sample integrity during collection. transportation. storage. and analysis A sample will be considered to be in custody if one of the following statements applies:

- It is in a person s physical possession or view
- It is in a secure area with restricted access
- It is placed in a container and secured with an official seal such that the sample cannot be reached without breaking the seal

Chain-of-custody procedures provide an accurate written record that traces the possession of individual samples from the time of collection in the field to the time of acceptance at the laboratory The chain-of-custody record (see Appendix C) also will be used to document all samples collected and the analysis requested Information that the field personnel will record on the chain-of-custody record includes:

- Project name
- Sampling location

- Name and signature of sampler
- Destination of samples (laboratory name)
- Sample identification number
- Date and time of collection
- Number and type of containers filled
- Analysis requested
- Preservatives used (if applicable)
- Filtering (if applicable)
- Sample designation (grab or composite)
- Signatures of individuals involved in custody transfer, including the date and time of transfer
- Airbill number (if applicable)
- Project contact and phone number

Unused lines on the chain-of-custody record will be crossed out. Chain-of-custody records that are initiated in the field will be signed by field personnel and the airbill number will be recorded. The record will be placed in a waterproof plastic bag and taped to the inside of the shipping container used to transport the samples. Signed airbills will serve as evidence of custody transfer between field personnel and the courier, and between the courier and the laboratory. Copies of the chain-of-custody record and the airbill will be retained and filed by field personnel before the containers are shipped.

Laboratory chain of custody begins with sample receipt and continues until samples are discarded. Laboratories analyzing samples must follow custody procedures at least as stringent as are required by the EPA CLP SOWs (EPA 1999a, 2000a). The laboratory should designate a specific individual as the sample custodian. The custodian will receive all incoming samples, sign the accompanying custody forms, and retain copies of the forms as permanent records. The laboratory sample custodian will record all pertinent information concerning the samples, including the persons delivering the samples, the date and time received, sample condition at the time of receipt (sealed, unsealed, or broken container; temperature; or other relevant remarks), the sample identification numbers, and any unique laboratory identification numbers for the samples. This information should be entered into a computerized LIMS. Once the sample transfer process is complete, the custodian is responsible for maintaining internal logbooks, tracking reports, and other records necessary to maintain custody throughout sample preparation and analysis.

The laboratory will provide a secure storage area for all samples. Access to this area will be restricted to authorized personnel. The custodian will ensure that samples requiring special handling, including samples that are heat- or light-sensitive, radioactive, or have other unusual physical characteristics, will be properly stored and maintained prior to analysis

2.3.5 Sample Shipment

All samples for chemical analyses collected during the course of a day will be shipped by express carrier that night for delivery the same day or the next morning. All samples for chemical analyses will be inserted into the correct sample container, labeled appropriately and immediately placed on ice. Appropriate information will be documented on the chain-of-custody form. Prior to shipping to the laboratory, the samples will be cleaned by wiping carefully with a paper towel (if necessary) and repacked in the cooler to comply with all Department of Transportation (DOT) regulations. The following procedures will be implemented when shipping groundwater samples collected during this project:

- The cooler will be filled with bubble wrap, sample bottles, and packing material. Sufficient packing material will be used to prevent sample containers from breaking during shipment. Enough ice will be added to maintain the sample temperature at or below 4 °C.
- The chain-of-custody records will be placed inside a plastic bag. The bag will be sealed and taped to the inside of the cooler lid. The air bill, if required, will be filled out before the samples are handed over to the carrier. The laboratory will be notified if the sampler suspects that the sample contains any substance that would require laboratory personnel to take safety precautions.
- The cooler will be closed and taped shut with strapping tape around both ends. If the cooler has a drain, it will be taped shut both inside and outside of the cooler
- Signed and dated custody seals will be placed on the front and side of each cooler. Wide clear tape will be placed over the seals to prevent accidental breakage
- The chain-of-custody record will be transported within the taped sealed cooler
- The cooler(s) will be delivered by an overnight or same day courier
- When the cooler is received at the analytical laboratory, laboratory personnel will open the cooler and sign the chain-of-custody record to document transfer of samples.

Multiple coolers may be sent in one shipment to the laboratory. The outside of the coolers will be marked to indicate the number of coolers in the shipment

2.4 ANALYTICAL METHODS

Table 8 presents the analytical methods that will be used to analyze samples collected from groundwater monitoring activities at Oil Island, and Appendix A presents the project QA objectives and control limits for sample analyses established as part of the DQO process (Section 1.3). Tables D-1 through D-3 in Appendix D present the individual target analytes required for this investigation and their associated RDLs. The analytical laboratories will attempt to achieve the RDLs for all the investigative samples collected. If problems occur in achieving the RDLs, the laboratories will contact the Waterstone analytical coordinator immediately and other alternatives will be pursued to achieve acceptable reporting limits. In addition, results below the reporting limit but above the MDL will be reported with appropriate flags to indicate the greater uncertainty associated with these values.

An off-site laboratory will be used for analysis of samples described in this QAPP. The analytical methods required for this investigation include EPA SW-846 methods (EPA 1996) and Standard Methods (APHA 1995). Protocols for laboratory selection and for ensuring laboratory compliance with project analytical and QA/QC requirements are presented in the following subsections.

2.4.1 Selection of Analytical Laboratories

Laboratories for this project will be selected from a list of qualified laboratories developed by Waterstone to support Waterstone client projects. Waterstone's laboratory qualification and selection process relies on (1) certification by the California Department of Health Services Environmental Laboratory Accreditation Program (CA-DOHS ELAP) and EPA Contract Laboratory Program (CLP) experience (2) the experience of the laboratory in supplying data quality certified by or compliant with regulatory programs and organizations including: Clean Water Act, RCRA Subtitle C (Hazardous Waste), RCRA Subtitle D (Solid Waste), CERCLA and SARA, Department of Defense, Department of Energy, etc. These aspects of laboratory selection are further described in the following subsections, along with Waterstone's procedures for selecting laboratories when project-specific analytical methods or QC requirements are not specifically addressed by the laboratory SOW.

2.4.1.1 Laboratory Evaluation

Laboratories are evaluated by Waterstone using the following procedures:

Certification and approval. Laboratories must be currently certified by the California Department of Health Services (DHS) Environmental Laboratory Accreditation Program (ELAP) for analysis of hazardous materials for each method specified.

Audits. Laboratories may demonstrate their qualifications by submitting to one or more audits by Waterstone. The audits may consist of (1) an on-site review of laboratory facilities, personnel, documentation, and procedures, or (2) an off-site review of hardcopy and electronic deliverables, or magnetic tapes. When deficiencies are identified, the laboratory must correct the problem and provide Waterstone with a written summary of the corrective action that was taken.

Waterstone currently has a qualified subcontractor laboratory that has passed this evaluation program and can meet the technical requirements in the laboratory SOW. This laboratory is listed in Appendix E. The laboratory was evaluated before being selected for this project. As noted above, Waterstone completes this reevaluation by verifying that required certifications and approvals are current, or auditing the laboratory. If a laboratory fails to meet any of the reevaluation criteria, it is removed from the list of approved and qualified laboratories.

2.4.1.2 Laboratory Statement of Work

The laboratory statement of work (SOW) establishes standard requirements for a variety of analytical methods. For each method, the laboratory SOW specifies standard method-specific target analyte lists and RDLs; QC samples and associated control limits; calibration requirements; and miscellaneous method performance requirements. The laboratory SOW also specifies standard data package requirements, electronic data deliverable formats, data qualifiers, and delivery schedules. In addition, the laboratory SOW outlines support services (such as providing sample containers, trip blanks, sample coolers, and custody forms and seals) that are expected of laboratories. The laboratory SOW incorporates Navy QA policy, as well as applicable EPA and state QA guidelines, as appropriate.

Waterstone's laboratory SOW addresses the methods to be used for the analysis of metals, radiochemistry and a variety of inorganic and physical parameters; including EPA SW-846 methods; EPA "Methods for Chemical Analysis of Water and Waste" (MCAWW); and "Standard Methods for the Examination of Water and Waste Water" published by the American Public Health Association, American Water Works Association, and Water Pollution Control Federation. Laboratories on Waterstone's prequalified list can elect to provide all or a portion of the analytical services specified in the laboratory SOW.

2.4.1.3 Laboratory Selection and Oversight

Once project-specific analytical and QA/QC requirements have been determined and documented in the QAPP, the Waterstone analytical coordinator works closely with a Waterstone procurement specialist to select a laboratory that can meet these requirements. When project-specific analytical and QC requirements are consistent with Waterstone's laboratory SOW, the analytical coordinator identifies one or more prequalified subcontractor laboratories that are capable of performing the work. As part of this process, the analytical coordinator typically contacts the laboratories to discuss the analytical requirements and project schedule. The analytical coordinator then forwards the name of the recommended laboratory (or laboratories) to the Waterstone procurement specialist, who issues a purchase order for the work. When analytical requirements are consistent with Waterstone's laboratory SOW and multiple prequalified laboratories are capable of performing the work, a specific laboratory is typically selected based on laboratory workload and project schedule considerations.

Waterstone follows a similar procedure when project-specific analytical and QC requirements are nonstandard and differ from those specified in Waterstone's laboratory SOW. The analytical coordinator contacts analytical

laboratories, beginning with those on Waterstone's prequalified list, to discuss the analytical and QA/QC requirements in the QAPP and to assess the laboratories' ability to meet the requirements In many cases, Waterstone works cooperatively with analytical laboratories to develop and refine appropriate QC requirements for nonstandard analyses or matrixes.

If the analytical coordinator is unable to identify one or more prequalified laboratories that can perform the work, additional laboratories are contacted. In general, the additional laboratories must be evaluated as described in Section 2 4 1 1 before they will be allowed to analyze any samples, although some evaluation steps may be waived for certain investigations and circumstances (for example, unusual analytes, urgent project needs, experimental methods, mobile laboratories, or on-site screening analysis). After additional laboratories have been identified, the analytical coordinator forwards their names to the procurement specialist The procurement specialist prepares a solicitation package including the project-specific analytical and QC requirements, and submits the package to the laboratories The procurement specialist, in cooperation with the analytical coordinator and project manager, then evaluates the proposals that are received and selects a laboratory that meets the requirements and provides the best value to Waterstone and the Navy Finally, the procurement specialist issues a purchase order to the selected laboratory that incorporates the project-specific analytical and QA/QC requirements

After a laboratory has been selected, the analytical coordinator holds a kickoff meeting with the laboratory project manager The kickoff meeting is held regardless of whether project-specific analytical and QA/QC requirements are consistent with Waterstone's laboratory SOW or are outside the SOW The Waterstone project manager, procurement specialist, and other key project and laboratory staff may also be involved in this meeting. The kickoff meeting includes a review of analytical and QC requirements in the QAPP, the project schedule, and any other logistical support that the laboratory will be expected to provide.

2.4.2 Project Analytical Requirements

The laboratory will be selected prior to initiation of the field program based on their ability to meet the project analytical and QC requirements, as well as their ability to meet the project schedule The analytical methods selected for the Oil Island groundwater monitoring activities are either standard EPA methods or from Standard Methods (APHA, 1995). The methods are comparable to the analytical methods used in previous monitoring activities at Oil Island and should provide comparable data

This QAPP documents project-specific QC requirements for the selected analytical methods. Sample volume, preservation, and holding time requirements are specified in Table 8 Requirements for laboratory QC samples are described in Table 4 and in Section 2.5 Appendix A includes project-specific precision and accuracy goals for the methods. Finally, project-required reporting limits for each method are documented in Appendix D.

2.5 QUALITY CONTROL

Waterstone will assess the quality of field data through collection and analysis of field QC samples. Laboratory QC samples will also be analyzed in accordance with referenced analytical method protocols to ensure that laboratory procedures and analyses are conducted properly and that the quality of the data is known.

2.5.1 Field Quality Control Samples

QC samples are collected in the field and analyzed to check sampling and analytical precision, accuracy, and representativeness. The following section discusses the types and purposes of field QC samples that will be collected for this project. Table 9 provides a summary of the types and frequency of collection of field QC samples.

2.5.1.1 Field Duplicates

Field duplicate samples are collected at the same time and from the same source and then submitted as separate samples to the laboratory for analysis. Field duplicates will be collected at a frequency one per groundwater sampling event (one for every three samples collected). Both samples will be assigned a unique sample identification number that is blind to the laboratory. Field duplicates may be sent to an independent laboratory for confirmation of analytical results.

2.5.1.2 Field Blanks

Contamination can be introduced from many external sources during collection of field samples. Field blanks will be collected at a frequency of one per sampling event (one for every three samples collected) to assess potential external sources of contamination. Field blank samples will consist of sample containers filled with analyte-free water. Deionized or distilled water will be used for all inorganic and radiochemistry parameters.

If any contaminant is present in the blank samples above the MDL, the result for associated field samples that contain the same contaminant will be qualified as potentially not detected if the concentration of the field sample is less than five times the concentration found in the blank.

TABLE 9

BEC- OIL ISLAND
FIELD ACTIVITIES
FIELD QC SAMPLES

Sample Type	Frequency of Analysis[a]	Matrix
Matrix spike and matrix spike duplicate	1 set per sampling event or 20 samples whichever is more frequent[b]	Aqueous
Field duplicate	1 set per sampling event or 20 samples whichever is more frequent[b]	Aqueous
Field Blank	1 set per sampling event or 20 samples whichever is more frequent[b]	Aqueous
Equipment Rinsate	1 set per sampling event or 20 samples whichever is more frequent[b]	Aqueous

Notes:

[a] Waterstone anticipates all three monitoring wells will be sampled per sampling event
[b] MS and MSDs will be selected by the laboratory.

2.5.1.3 Equipment Rinsate Samples

Equipment rinsate samples demonstrate whether decontamination procedures are effective in removing contaminants from the field sampling equipment. The presence of contamination in equipment rinsate samples indicates that cleaning procedures were not effective, allowing for the possibility of cross-contamination. Equipment rinsate samples will be collected at a frequency of one per day per piece of equipment. An equipment rinsate is a sample collected after a sampling device is subjected to standard decontamination procedures. Water will be poured over or through the sampling equipment into a sample container and sent to the laboratory for analysis. Deionized or distilled water will be used for inorganic parameters

Equipment rinsate samples will be sent blind to the laboratory. During data validation, the results for the equipment rinsate samples will be used to qualify data or to evaluate the levels of analytes in the field samples collected on the same day

2.5.2 Laboratory Quality Control Samples

Laboratory QC samples are prepared and analyzed at the laboratory to evaluate the effectiveness of sample preparation and analysis and to assess analytical precision and accuracy. The types of laboratory QC samples that will be used for this project are discussed in the following sections. Table 4 presents the required frequencies for laboratory QC samples, and Appendix A presents project-specific precision and accuracy goals for these samples

2.5.2.1 Matrix Spike and Matrix Spike Duplicates

MS/MSD samples require the collection of an additional volume of material for laboratory spiking and analysis. MS/MSD samples will be collected at a frequency of one set per groundwater sampling event (one set for every three samples collected). Matrix spike samples measure the efficiency of all the steps in the analytical method in recovering target analytes from an environmental matrix. The percent recoveries will be calculated for each of the spiked analytes and used to evaluate analytical accuracy. The RPD between spiked samples will be calculated to evaluate precision. Project-specific precision and accuracy goals are presented in Appendix A

Laboratory control samples will be analyzed to assess analytical accuracy, and field duplicate samples will be collected and analyzed to assess overall precision

2.5.2.2 Method Blanks

Method blanks are prepared to evaluate whether contamination is originating from the reagents used in sample handling, preparation, or analysis. They are critical in distinguishing between low-level field contamination and

laboratory contamination. A method blank consists of laboratory analyte-free water and all of the reagents used in the analytical procedure. It is prepared for every analysis in the same manner as a field sample and is processed through all of the analytical steps. Method blanks will be prepared at the frequency prescribed in the individual analytical method or at a rate of 5 percent of the total samples if a frequency is not prescribed in the method.

2.5.2.3 Laboratory Control Samples or Blank Spikes

A laboratory control sample (LCS), or blank spike, originates in the laboratory as deionized or distilled water that has been spiked with standard reference materials of a known concentration. A LCS is analyzed to verify the accuracy of the calibration standards. These internal QC samples are also used to evaluate laboratory accuracy in the presence of matrix interference for field samples. LCSs are processed through the same analytical procedure as field samples. LCSs will be analyzed at the frequency prescribed in the analytical method or at a rate of 5 percent of the total samples if a frequency is not prescribed in the method. If percent recovery results for the LCS or blank spike are outside of the established goals, laboratory-specific protocols will be followed to gauge the usability of the data.

2.5.3 Additional Laboratory Quality Control Procedures

In addition to the analysis of laboratory QC samples, subcontractor laboratories will conduct the QC procedures discussed in the following sections.

2.5.3.1 Method Detection Limit Studies

The method detection limit (MDL) is the minimum concentration of an analyte that can be measured and reported. The MDL is the minimum concentration at which an analyte can be detected with 99 percent confidence. The MDL takes into account sample matrix and preparation. The subcontractor laboratory will demonstrate the MDLs for all analyses except inorganic analyses and physical properties test methods.

MDL studies will be conducted annually or more frequently if any method or instrumentation changes. Each MDL study will consist of seven replicates spiked with all target analytes of interest at concentrations no greater than required quantitation limits. The replicates will be prepared and analyzed in the same manner as routine samples. If multiple instruments are used, each will be included in the MDL study. The MDLs reported will be representative of the least sensitive instrument.

2.5.3.2 Control Charts

Control charts document data quality in graphic form for specific method parameters such as surrogates and blank spike recoveries. A collection of data points for each parameter is used to statistically calculate means and control

limits for a given analytical method This information is useful in determining whether analytical measurement systems are in control. In addition, control charts provide information about trends over time in specific analytical and preparation methodologies. Although they are not required, Waterstone recommends that subcontractor laboratories maintain control charts for organic and inorganic analyses. At a minimum, method-blank surrogate recoveries and blank spike recoveries should be charted for all organic methods Blank spike recoveries should be charted for inorganic methods. Control charts should be updated monthly

2.6 EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

This section outlines the testing, inspection, and maintenance procedures that will be used to keep both field and laboratory equipment in good working condition

2.6.1 Maintenance of Field Equipment

Preventive maintenance for most field equipment is carried out in accordance with procedures and schedules recommended in (1) the equipment manufacturer's literature or operating manual, or (2) SOPs that describe equipment operation associated with particular applications of the instrument. However, more stringent testing, inspection, and maintenance procedures and schedules may be required when field equipment is used to make critical measurements.

A field instrument that is out of order will be segregated, clearly marked, and not used until it is repaired The field team leader will be notified of equipment malfunctions so that prompt service can be completed quickly or substitute equipment can be obtained. When equipment condition is suspect, unscheduled testing, inspection, and maintenance should be conducted Any significant problems with field equipment will be reported in the daily field notes.

2.6.2 Maintenance of Laboratory Equipment

Subcontractor laboratories will prepare and follow a maintenance schedule for each instrument used to analyze samples collected from Oil Island All instruments will be serviced at scheduled intervals necessary to optimize factory specifications. Routine preventive maintenance and major repairs will be documented in a maintenance logbook.

An inventory of items to be kept ready for use in case of instrument failure will be maintained and restocked as needed The list will include equipment parts subject to frequent failure, parts that have a limited lifetime of optimum performance, and parts that cannot be obtained in a timely manner

The laboratory's QA plan and written SOPs will describe specific preventive maintenance procedures for equipment maintained by the laboratory These documents identify the personnel responsible for major, preventive, and daily

maintenance procedures, the frequency and type of maintenance performed, and procedures for documenting maintenance activities.

Laboratory equipment malfunctions will require immediate corrective action. Actions should be documented in laboratory logbooks. No other formal documentation is required unless data quality is adversely affected or further corrective action is necessary. On-the-spot corrective actions will be taken as necessary in accordance with the procedures described in the laboratory QA plan and SOPs.

2.7 INSTRUMENT CALIBRATION AND FREQUENCY

The following sections discuss calibration procedures that will be followed to ensure the accuracy of measurements made using field and laboratory equipment.

2.7.1 Calibration of Field Equipment

Field equipment will be calibrated at the beginning of the field effort and at prescribed intervals. The calibration frequency depends on the type and stability of equipment, the intended use of the equipment, and the recommendation of the manufacturer. Detailed calibration procedures for field equipment are available from the specific manufacturers' instruction manuals. All calibration information will be recorded in a field logbook or on field forms. Equipment calibration records will be readily available for reference.

2.7.2 Calibration of Laboratory Equipment

Laboratory equipment calibration procedures and frequencies will follow the requirements in the reference method in Section 2.4.2 of this QAPP. Qualified analysts will calibrate laboratory equipment and document the procedures and results in a logbook.

The laboratory will obtain calibration standards from commercial vendors for all analytes. Standards will be NIST traceable, A2LA certified or shall conform to NELAC standards. Stock solutions for inorganic mixes will be made from reagent-grade chemicals or as specified in the analytical method. Stock standards will also be used to make intermediate standards that will be used to prepare calibration standards. Special attention will be paid to expiration dating, proper labeling, proper refrigeration, and freedom from contamination. Documentation on receipt, mixing, and use of standards will be recorded in the appropriate laboratory logbook. Additional specific handling and documentation requirements for the use of standards may be provided in subcontractor laboratory QA plans.

2.8 INSPECTION AND ACCEPTANCE OF SUPPLIES AND CONSUMABLES

Waterstone project managers have primary responsibility for identifying the types and quantities of supplies and consumables needed to complete projects and are also responsible for determining acceptance criteria for these items.

Supplies and consumables can be received either at the Waterstone office or at the work site. When supplies are received at an office, the project manager or field team leader will sort them according to vendor, check packing slips against purchase orders, and inspect the condition of all supplies before they are accepted for use on a project. If an item does not meet the acceptance criteria, deficiencies will be noted on the packing slip and purchase order, and the item will then be returned to the vendor for replacement or repair.

Procedures for receiving supplies and consumables in the field are similar. When supplies are received, the Waterstone project manager or field team leader will inspect all items against the acceptance criteria. Any deficiencies or problems will be noted in the field logbook, and deficient items will be returned for immediate replacement.

Analytical laboratories are required to provide certified clean containers for all analyses. These containers must meet EPA standards described in "Specifications and Guidance for Obtaining Contaminant-Free Sampling Containers" (EPA 1992).

2.9 NON-DIRECT MEASUREMENTS

No data for project implementation or decision-making were obtained from non-direct measurement sources.

2.10 DATA MANAGEMENT

Field and analytical data collected from this project are critical in determining whether the levels of metals and gross alpha and beta are naturally occurring. An information management system is necessary to ensure efficient access so that decisions based on the data can be made in a timely manner.

After the field and laboratory data reports are reviewed and validated, the data will be entered into Waterstone's database for Oil Island. The database contains data for (1) summarizing observations on contamination and geologic conditions, (2) preparing reports and graphics, and (3) for potential use with geographic information systems (GIS). The following sections describe Waterstone's data tracking procedures, data pathways, and overall data management strategy for Oil Island.

2.10.1 Data-Tracking Procedures

All data that are generated are tracked through a database created by Waterstone. Information related to the receipt and delivery of samples, project order fulfillment, and invoicing for laboratory and validation tasks is stored in a Waterstone database.

2.10.2 Data Pathways

Data are generated from three primary pathways at Oil Island—data derived from field activities, laboratory analytical data, and validated data. Data from all three pathways must be entered into the Waterstone database. To evaluate whether the data have been accurately loaded into the database in a timely manner, data pathways must be established and well documented.

Data generated during field activities are recorded using field forms (Appendix C). These forms are reviewed for completeness and accuracy by the analytical coordinator or field team leader. Data from the field forms, including the chain-of-custody form, are entered into the Waterstone database according to the document control number.

Data generated during laboratory analysis are recorded in hardcopy and in EDDs after the samples have been analyzed. The laboratory will send the hardcopy and EDDs records to the analytical coordinator. The analytical coordinator reviews the data deliverable for completeness, accuracy, and format. After the format has been approved, the electronic data are downloaded into the Waterstone database. Waterstone data entry personnel will then update the database with the total number of samples received and number of days required to receive the data.

After validation, the analytical coordinator reviews the data for accuracy. Waterstone will then update the Oil Island database with the appropriate data qualifiers.

2.10.3 Data Management Strategy

All data will be loaded into the database at Waterstone for storage, further manipulation, and retrieval after the off-site laboratory and field reports are reviewed and validated. The database will be used to provide data for chemical and geologic analysis and for preparing reports and graphic representations of the data. Additional data acquired from field activities are recorded on field forms (Appendix C) that are reviewed for completeness and accuracy by the analytical coordinator or field team leader. Hard copies of forms, data, and chain-of-custody forms are filed in a secure storage area according to project and document control numbers. Laboratory data packages and reports will be archived at Waterstone or Navy offices. Laboratories that generated the data will archive hard-copy data for a minimum of 10 years.

3.0 ASSESSMENT AND OVERSIGHT

This section describes the field and laboratory assessments that may be conducted during this project, the individuals responsible for conducting assessments, corrective actions that may be implemented in response to assessment results, and how quality-related issues will be reported to Waterstone and BreitBurn management.

3.1 ASSESSMENT AND RESPONSE ACTIONS

Waterstone and BreitBurn will oversee environmental data collection using the assessment and audit activities described below. Any problems encountered during an assessment of field investigation or laboratory activities will require appropriate corrective action to ensure that the problems are resolved. This section describes the types of assessments that may be completed, Waterstone and BreitBurn responsibilities for conducting the assessments, and corrective action procedures to address problems identified during an assessment.

3.1.1 Field Assessments

As needed, Waterstone may conduct field assessments to support data quality and encourage continuous improvement in the systems that support environmental data collection. Technical systems audits (TSA) are the type of field assessment most frequently conducted. Waterstone personnel conducting TSAs use personnel interviews, direct observations, and reviews of project-specific documentation to evaluate and document whether procedures specified in the approved QAPP are being implemented. Specific items that may be observed during the TSA include:

- Availability of project plans such as the QAPP and HSP
- Documentation of personnel qualifications and training
- Sample collection, identification, preservation, handling, and shipping procedures
- Sampling equipment decontamination
- Equipment calibration and maintenance
- Completeness of logbooks and other field records (including nonconformance documentation)
- Health and safety procedures

During the TSA, the lead Waterstone assessor verbally communicates any significant deficiencies to the FTL for immediate correction. These and all other observations and comments are documented in a draft TSA report. The

draft TSA report is issued to the Navy QA officer and the Navy remedial project manager and to the Waterstone project manager, FTL, program QA manager, and project QA officer in electronic (e-mail) format within 7 days after the TSA is completed Project teams are required to respond to the draft report within 3 days, and a final TSA report is issued within 7 days after the project team responds.

The Waterstone program QA manager determines the frequency and duration of TSAs Generally, TSAs are conducted early in the project so that any quality issues can be resolved before large amounts of data are collected. The Waterstone program QA manager will notify the Navy QA officer and Navy remedial project manager before a TSA is conducted so that they may attend the TSA and observe the field assessment

3.1.2 Laboratory Assessments

As described in Section 2 4 1, Waterstone may conduct assessments of laboratories that analyze samples collected for the project. These assessments may include (1) reviews of laboratory certifications, (2) laboratory audits Laboratory audits may consist of an on-site review of laboratory facilities. personnel, documentation, and procedures. or an off-site evaluation of the ability of the laboratory's data management system to meet contract requirements. Waterstone also may conduct laboratory assessments when an approved laboratory has been selected for nonroutine analyses or when a laboratory that is not on the approved list must be used

3.1.3 Assessment Responsibilities

When assessments are performed. Waterstone personnel conducting assessments will be independent of the activity being evaluated. The Waterstone program QA manager will select the appropriate personnel to conduct each assessment and will assign them responsibilities and deadlines for completing the assessment These personnel may include the program QA manager. project QA officer. or senior technical staff with relevant expertise and assessment experience

When an assessment is planned. the Waterstone program QA manager selects a lead assessor who is responsible for:

- Selecting and preparing the assessment team
- Preparing an assessment plan
- Coordinating and scheduling the assessment with the project team. subcontractor. or other organization being evaluated!
- Participating in the assessment
- Coordinating preparation and issuance of assessment reports and corrective action request forms
- Evaluating responses and resulting corrective actions.

After the assessment is completed. the lead assessor will submit an audit report to appropriate personnel.

3.1.4 Field Corrective Action Procedures

Field corrective action procedures will depend on the type and severity of the finding. Waterstone classifies assessment findings as either deficiencies or observations. Deficiencies are findings that may have a significant impact on data quality and that will require corrective action. Observations are findings that do not directly affect data quality, but are suggestions for consideration and review.

As described in Section 3.1.1, project teams are required to respond to deficiencies identified in TSA reports. The project manager, FTL, and project QA officer will meet to discuss the deficiencies and the appropriate steps to resolve each deficiency by:

- Determining when and how the problem developed
- Assigning responsibility for problem investigation and documentation
- Selecting the corrective action to eliminate the problem
- Developing a schedule for completing the corrective action
- Assigning responsibility for implementing the corrective action
- Documenting and verifying that the corrective action has eliminated the problem
- Notifying the Navy of the problem and the corrective action taken

In responding to the TSA report, the project team will include a brief description of each deficiency, the proposed corrective action, the individual responsible for determining and implementing the corrective action, and the completion dates for each corrective action. The project QA officer will use a status report to monitor the status of all corrective actions.

The Waterstone program QA manager is responsible for to reviewing proposed corrective actions and verifying that they have been effectively implemented. The program QA manager can require data acquisition to be limited or discontinued until the corrective action is complete and a deficiency is eliminated. The program QA manager can also request the reanalysis of any or all data acquired since the system was last in control.

3.1.5 Laboratory Corrective Action Procedures

Internal laboratory procedures for corrective action and descriptions of out-of-control situations that require corrective action are contained in laboratory QA plans. At a minimum, corrective action will be implemented when any of the following three conditions occurs: control limits are exceeded, method QC requirements are not met, or sample-holding times are exceeded. The laboratory will report out-of-control situations to the Waterstone analytical coordinator within 2 working days after they are identified. In addition, the laboratory project manager will prepare

and submit a corrective action report to the Waterstone analytical coordinator. This report will identify the out-of-control situation and the steps that the laboratory has taken to rectify it.

3.2 REPORTS TO MANAGEMENT

Effective management of environmental data collection requires (1) timely assessment and review of all activities and (2) open communication, interaction, and feedback among all project participants. Waterstone will use the reports described below to address any project-specific quality issues and to facilitate timely communication of these issues

3.2.1 Daily Progress Reports

Waterstone will prepare field notes to report daily progress throughout the field investigation. These notes will describe sampling and field measurements, equipment used, Waterstone and subcontractor personnel on site, QA/QC and health and safety activities, problems encountered, corrective actions taken, deviations from the QAPP, and explanations for the deviations. The daily progress notes are prepared by the field team leader and submitted to the project manager. As needed, the content of the daily field notes will be summarized and included in the final report submitted for the field investigation

3.2.2 Project Monthly Status Report

As needed, the Waterstone project manager will prepare a monthly status report (MSR) to be submitted to the Waterstone's program manager and BreitBurn. Monthly status reports address project-specific quality issues and facilitate their timely communication. The MSR will include the following quality-related information:

- Project status
- Instrument, equipment, or procedural problems that affect quality and recommended solutions
- Objectives from the previous report that were achieved
- Objectives from the previous report that were not achieved
- Work planned for the next month

If appropriate, Waterstone will obtain similar information from subcontractors participating in the project and will incorporate the information within the MSR.

3.2.3 Quality Control Summary Report

Waterstone will prepare a QC summary report (QCSR) that will be submitted with the final report for the field activities The QCSR will include a summary and evaluation of QA/QC activities, including any field or laboratory assessments, completed during the investigation. The QCSR will also indicate the location and duration of storage for the complete data packages. Particular emphasis will be placed on determining whether project DQOs were met and whether data are of adequate quality to support required decisions

4.0 DATA VALIDATION AND USABILITY

This section describes the procedures that are planned to review, verify, and validate field and laboratory data. This section also discusses procedures for verifying that the data are sufficient to meet DQOs for the project.

4.1 DATA REVIEW, VERIFICATION, AND VALIDATION

Validation and verification of the data generated during field and laboratory activities are essential to obtaining data of defensible and acceptable quality. Verification and validation methods for field and laboratory activities are presented below.

4.1.1 Field Data Verification

Project team personnel will verify field data through reviews of data sets to identify inconsistencies or anomalous values. Any inconsistencies discovered will be resolved as soon as possible by seeking clarification from field personnel responsible for data collection. All field personnel will be responsible for following the sampling and documentation procedures described in this QAPP so that defensible and justifiable data are obtained.

Data values that are significantly different from the population are called "outliers." A systematic effort will be made to identify any outliers or errors before field personnel report the data. Outliers can result from improper sampling or measurement methodology, data transcription errors, calculation errors, or natural causes. Outliers that result from errors found during data verification will be identified and corrected; outliers that cannot be attributed to errors in sampling, measurement, transcription, or calculation will be clearly identified in project reports.

4.1.2 Laboratory Data Verification

Laboratory personnel will verify analytical data at the time of analysis and reporting and through subsequent reviews of the raw data for any nonconformances to the requirements of the analytical method. Laboratory personnel will make a systematic effort to identify any outliers or errors before they report the data. Outliers that result from errors found during data verification will be identified and corrected; outliers that cannot be attributed to errors in analysis, transcription, or calculation will be clearly identified in the case narrative section of the analytical data package.

4.1.3 Laboratory Data Validation

An independent third-party contractor will validate all laboratory data in accordance with current EPA national functional guidelines (EPA 1994, 1999b). The data validation strategy will be consistent with Navy guidelines. For

this project, two of the three groundwater samples collected will undergo cursory validation and one will undergo full validation Requirements for cursory and full validation are listed below.

4.1.3.1 Cursory Data Validation

Cursory validation will be completed on the summary data packages for analysis of groundwater samples The data reviewer is required to notify Waterstone and request any missing information needed from the laboratory. Elimination of the data from the review process is not allowed. All data will be qualified as necessary in accordance with established criteria. Data summary packages will consist of sample results and QC summaries, including calibration and internal standard data.

4.1.3.2 Full Data Validation

Full validation will be completed on full data packages for analysis of groundwater samples. The data reviewer is required to notify Waterstone and request any missing information needed from the laboratory Elimination of data from the review process is not allowed. All data will continue through the validation process and will be qualified in accordance with established criteria Data summary packages will consist of sample results. QC summaries, and all raw data associated with the sample results and QC summaries

4.1.3.3 Data Validation Criteria

Table 10 lists the QC criteria that will be reviewed for both cursory and full data validation The data validation criteria selected from Table 10 will be consistent with the project-specific analytical methods listed in Section 2.4 of the QAPP

4.2 RECONCILIATION WITH USER REQUIREMENTS

After environmental data have been reviewed, verified, and validated in accordance with the procedures described in Section 4.1, the data must be further evaluated to determine whether DQOs have been met

TABLE 10

BEC - OIL ISLAND
FIELD ACTIVITIES
DATA VALIDATION CRITERIA

Analytical Parameter Group	Cursory Data Validation Criteria	Full Data Validation Criteria
Inorganic Analyses	Holding times Calibration Blanks Matrix spike recovery Matrix duplicate sample analysis Laboratory control sample or blank spike Field duplicate sample analysis Inductively Coupled Plasma (ICP) serial dilution Overall assessment of data for an SDG	Holding times Calibration Blanks ICP interference check sample Matrix spike recovery Matrix duplicate sample analysis Laboratory control sample Field duplicate sample analysis Graphite furnace atomic absorption QC Sample result verification ICP serial dilution Detection limits Overall assessment of data for an SDG
Wet Chemistry and Radiochemistry Analyses	Method compliance Holding times Calibration Blanks Matrix spike and matrix spike duplicate recovery Laboratory control sample or blank spike Field duplicate sample analysis Other laboratory QC specified by the method Overall assessment of data for an SDG	Method compliance Holding times Calibration Blanks Matrix spike and matrix spike duplicate recovery Laboratory control sample Field duplicate sample analysis Other laboratory QC specified by the method Detection limits Analyte identification Analyte quantitation Sample results verification Overall assessment of data for an SDG

To the extent possible, Waterstone will follow EPA's data quality assessment (DQA) process to verify that the type, quality, and quantity of data collected are appropriate for their intended use. DQA methods and procedures are outlined in EPA's "Guidance for Data Quality Assessment, Practical Methods for Data Analysis" (2000c) The DQA process includes five steps: (1) review the DQOs and sampling design; (2) conduct a preliminary data review; (3) select a statistical test; (4) verify the assumptions of the statistical test; and (5) draw conclusions from the data.

When the five-step DQA process is not completely followed because the DQOs are qualitative in nature, Waterstone will systematically assess data quality and data usability This assessment will include:

- A review of the sampling design and sampling methods to verify that these were implemented as planned and are adequate to support project objectives
- A review of project-specific data quality indicators for precision, accuracy, representativeness, completeness, comparability, and quantitation limits (defined in Section 1.3.2) to determine whether acceptance criteria have been met
- A review of project-specific DQOs to determine whether they have been achieved by the data collected
- An evaluation of any limitations associated with the decisions to be made based on the data collected For example, if data completeness is only 90 percent compared to a project-specific completeness objective of 95 percent, the data may still be usable to support a decision, but at a lower level of confidence

The final report for the project will discuss any potential impacts of these reviews on data usability and will clearly define any limitations associated with the data

REFERENCES

U S. Environmental Protection Agency (EPA). 1992 "Specifications and Guidance for Obtaining Contaminant-Free Sampling Containers." OSWER Directive No 9240.0-05A. April.

EPA. 1994. "National Functional Guidelines for Inorganic Data Review" Office of Emergency and Remedial Response. Washington, DC EPA-540/R-94/013 February

EPA 1996. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846), Update III." Office of Solid Waste and Emergency Response. Washington, DC. December.

EPA 1999a. "U.S. EPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration" Document Number OLM04.2. May.

EPA 1999b "National Functional Guidelines for Organic Data Review" Office of Emergency and Remedial Response. Washington, DC. EPA-540/R-99-008. October.

EPA 2000a. "U S EPA Contract Laboratory Program Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration." Document Number ILM04.1 January

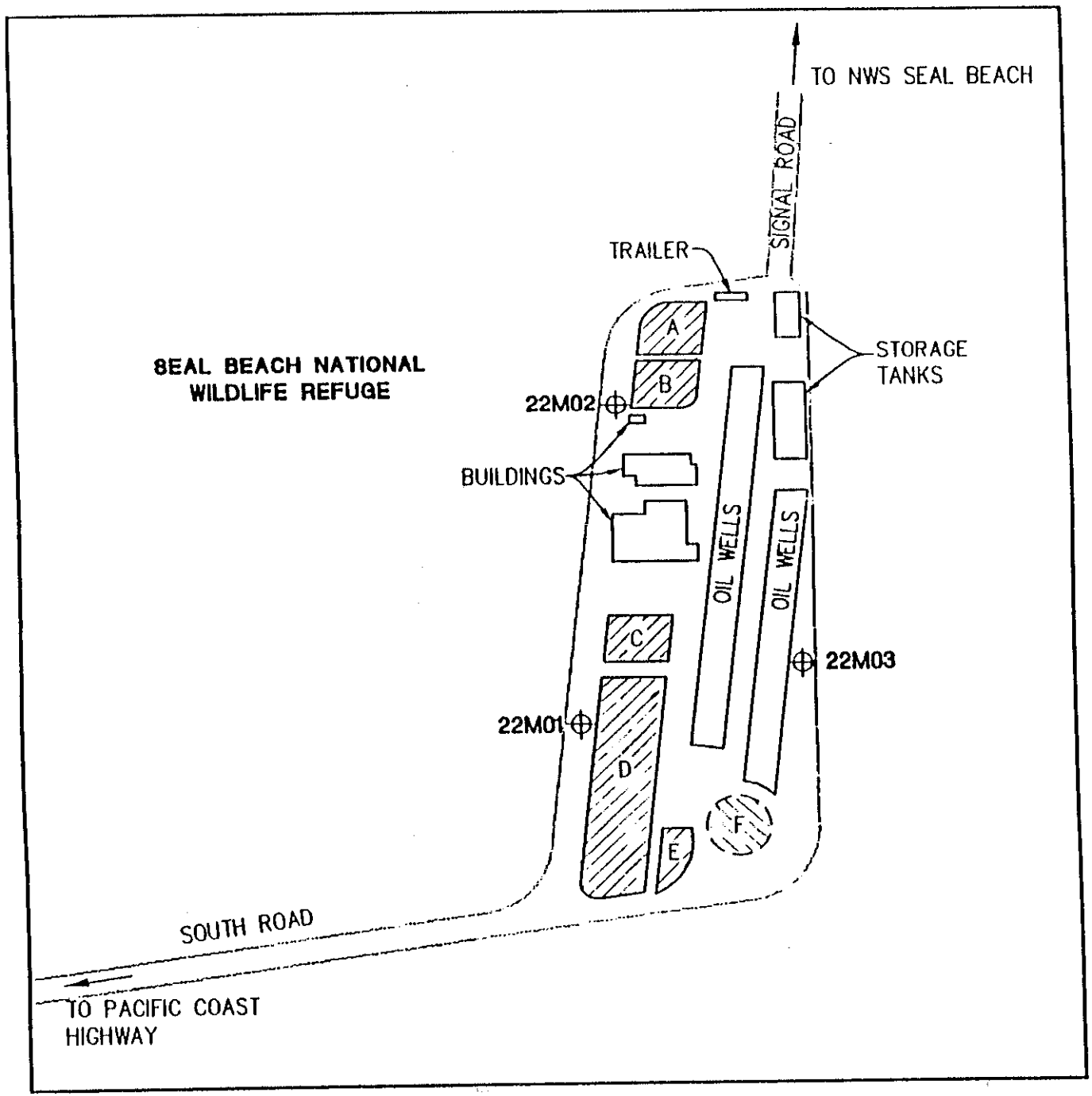
EPA 2000b. "Data Quality Objectives Process for Hazardous Waste Site Investigations (EPA QA/ G-4HW)." Office of Environmental Information Washington, D.C. EPA/600/R-00/007 January

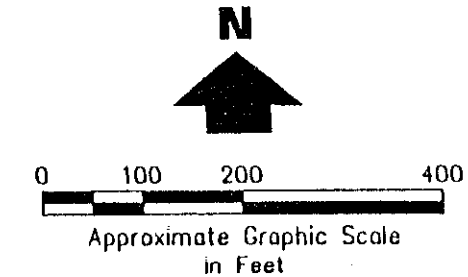
EPA 2000c. "Guidance for Data Quality Assessment, Practical Methods for Data Analysis, EPA QA/ G-9, QA00 Update" Office of Environmental Information. Washington, D C. EPA/600/ R-96-084. July

EPA. 2000d. "Guidance for the Data Quality Objectives Process, EPA QA/G-4." Office of Environmental Information Washington. DC EPA/600/R-96/055 August

EPA. 2001. "EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5." Office of Environmental Information. Washington. DC. EPA/240/B-01/003. March

American Public Health Association (APHA), 1995 "Standard Methods for the Examination of Water and Waste Water." American Water Works Association, Water Pollution Control Federation. 19th Edition





LEGEND

⊕ 22M01 GROUNDWATER MONITORING WELL

LAGOON (POND)

FILLED LAGOON

FIGURE 2

PLOT PLAN

Site 22 Oil Island- Seal Beach, CA
BreitBurn Energy Corporation, LLC

APPENDIX A

METHOD PRECISION AND ACCURACY GOALS

TABLE A-1

METALS, RADIOCHEMISTRY AND INORGANIC ANALYSES
METHOD PRECISION AND ACCURACY GOALS

Analyses	Method[a]	Matrix Spike and Matrix Spike Duplicate Samples		Laboratory Control Samples[b]	
		% Recovery	RPD	% Recovery	RPD
Metals	EPA 6010B	75-125	35	80-120	20
Alkalinity	SM 2320, Titrimetric	75-125	20	80-120	20
Chloride, Sulfate	EPA 300.0	75-125	20	80-120	20
pH	EPA 150.1	N/A	20	N/A	20
Specific Conductivity	EPA 120.1	N/A	20	N/A	20
Total Dissolved Solids	EPA 160.1	N/A	20	80-120	20
Gross Alpha/Beta	EPA 900.0 or 0-02	N/A	25	80-120	20
Total Radium (226/228)	EPA 903.1 and 904.0	75-125	25	80-120	20
Total Uranium	EPA 908.0 or Alpha Spectroscopy	75-125	25	80-120	20
Radon	SM 7500	75-125	25	80-120	20
Gamma Emitters	EPA 901.1	N/A	25	80-120	20

Notes:

[a] Complete method references are provided in Section 2.4 of this QAPP

EPA U.S. Environmental Protection Agency
RPD Relative percent difference

TABLE A-2

RADIOCHEMISTRY
METHOD TRACER RECOVERY GOALS

Analyses	Method[a]	Tracer % Recovery
Total Uranium	EPA 908.0 or Alpha Spectroscopy	30-105

Notes:

[a] Complete method references are provided in Section 2.4 of this QAPP.

EPA U S Environmental Protection Agency
RPD Relative percent difference

APPENDIX B

STANDARD OPERATING PROCEDURES

WATERSTONE ENVIRONMENTAL, INC., STANDARD PROTOCOL FOR COLLECTION OF SOIL SAMPLES USING A HAND AUGER

A 5-foot-long stainless steel hand auger, fitted with 5-foot long conduit extension(s) as needed, is used to drill an approximately 2- 1/4 inch-diameter boring to the proposed depth. Each soil sample is collected by hand driving a solid or split-spoon sampler lined with a 6-inch brass tube into the undisturbed soil at each sampling depth. The sample tubes are removed from the sample and trimmed of excess soil. The end of the sample tube is covered with squares of Teflon sheeting, plastic end caps, and waterproof, labeled, and placed inside a ziplock bag. A sample label is attached to each tube identifying the date the sample was collected, a unique identification number, and other identifying information

Soil samples are placed in a thermally insulated container with ice and shipped or couriered to a State-certified hazardous waste-testing laboratory (or delivered immediately to an on-site mobile laboratory) using the appropriate chain-of-custody procedures.

Prior to and between the sampling intervals, all reusable equipment is decontaminated by washing in a non-phosphate detergent (Alconox) solution The equipment is then rinsed in tap water, and then rinsed in distilled water.

WATERSTONE ENVIRONMENTAL, INC.,
STANDARD PROTOCOL

Collection of Soil Samples Using A Strataprobe

Undisturbed soil samples are collected using a split spoon drive sampler. The soil sampling device is deployed, by a Strataprobe rig The Strataprobe is a rig with a hydraulic system that is used to push hollow steel rods with a sampling device at the end of the rods through the subsurface. The Strataprobe rig pushes the sampling device to the targeted depth for sample retrieval.

Once the sampling probe is pushed to the desired depth, internal rods are placed inside the hollow push rods and are connected to the retractable tip of the sampling probe. The tip is then retracted and the split spoon sampling probe is advanced another foot so soil can enter the sampling device. The sampling device is lined with three 6-inch long and 1.25-inch diameter steel tube. Upon retrieval of the soil sampling device, the brass tube at the lower end of the sampler is covered with Teflon tape and plastic end caps, labeled identifying the date the sample is collected and an identification designation, and placed in a cooler to be shipped to a certified analytical laboratory.

The material in the remaining brass tubes were placed in a ziplock bag to conduct headspace testing on the material after sufficient volatilization had occurred (approximately 5 minutes). The probe of a Organic Vapor Monitor (OVM) photoionization detector (PID) calibrated to isobutylene is placed inside the bag to monitor for volatile organic vapors. Following headspace measurements the sample is visually inspected by the site hydrogeologist and classified using the Unified Soil Classification System. The soil is inspected for color, texture, grain size distribution, moisture content, odor, and any other distinguishing characteristics. Lithologic data, PID readings and other pertinent data are recorded on a boring log.

Prior to sampling, all reusable sampling equipment is decontaminated by washing in a solution of non-phosphate soap and water. The equipment is then double rinsed in distilled water. The sample push rods are steam cleaned on-site between each sample location. The rinsate water is placed in Department of Transportation approved 55-gallon drums and centralized to an on-site location.

All soil sample locations are backfilled with bentonite chips and hydrated and then capped with asphalt patch or concrete to grade.

APPENDIX C

FIELD FORMS

WATERSTONE ENVIRONMENTAL, INC.

DAILY FIELD ACTIVITY LOG

PAGE _____ OF _____

PROJECT #: _____ **Waterstone Staff Onsite:** _____

Date: _____

Project Name and Address: _____

Activities Planned for Today: _____

Subs Onsite Today: _____

DESCRIPTION OF DAILY ACTIVITIES AND EVENTS:

TAILGATE SAFETY MEETING

DATE: _____ TIME: _____ PROJECT NO: _____

SITE LOCATION: _____

TRAINING PRESENTED BY: _____

TOPICS COVERED: _____

ATTENDEES

NAME PRINT	SIGNATURE

SAFETY OFFICER: _____ DATE: _____

WATERSTONE ENVIRONMENTAL, INC.

2963 E CORONADO ST * ANAHEIM CA 92806
714-414-1122 * FAX: 714-414-1166
E:MAIL: ADMIN@WATERSTONE-ENV.COM

INSTRUMENT CALIBRATION LOG

Client Name and Site	Project Manager:	Task Number:

Calibration Event:

Person Calibrating:	Date
Instrument Type:	Calibration Gas:
Model:	Calibration Gas Concentration (ppm):
Serial #:	Reading (ppm):
Calibrator Model:	Advised Reading (if necessary):
Comments:	

Person Calibrating:	Date
Instrument Type:	Calibration Gas:
Model:	Calibration Gas Concentration (ppm):
Serial #:	Reading (ppm):
Calibrator Model:	Advised Reading (if necessary):
Comments:	

Person Calibrating:	Date
Instrument Type:	Calibration Gas:
Model:	Calibration Gas Concentration (ppm):
Serial #:	Reading (ppm):
Calibrator Model:	Advised Reading (if necessary):
Comments:	

Person Calibrating:	Date
Instrument Type:	Calibration Gas:
Model:	Calibration Gas Concentration (ppm):
Serial #:	Reading (ppm):
Calibrator Model:	Advised Reading (if necessary):
Comments:	

Person Calibrating:	Date
Instrument Type:	Calibration Gas:
Model:	Calibration Gas Concentration (ppm):
Serial #:	Reading (ppm):
Calibrator Model:	Advised Reading (if necessary):
Comments:	

DIRECT READING
AIR MONITORING LOG

PROJECT NAME: _____ DATE: _____
PROJECT NO: _____

TIME	LOCATION	ACTIVITY	INSTRUMENT	SUBSTANCE / AGENT	CONCENTRATION	INITIALS

Weather Conditions: _____ Wind Speed: _____ Wind Dir: _____ Temp: _____

Comments: _____

INVENTROY OF DRUMS OR BINS AT ____________________

This form offers notification that material stored in drums/bins is present at the following job site:

Client: ______________________________

Job: ______________________________

Drum Location Address: ____________________ City: ____________ Zip: ________

Date Material Placed in Drums / Bins

DRUM / BIN ID#	BORING ID# (S)	DEPTH INTERVAL IN DRUM	SOIL OR WATER	LAB ANALYSES AVAILABLE FOR THIS INTERVAL?

PROJECT MANAGER ____________________ PHONE ____________

CLIENT CONTACT / PHONE ______________________________

DATE CLIENT NOTIFIED OF DRUMS ON SITE ____________________

BY: ☐ PHONE ☐ FAX ☐ LETTER ☐ IN PERSON

COPY OF THIS FORM RECEIVED BY CLIENTS? ☐ YES ☐ NO

MATERIALS INVENTORY FORM*

FOR _____

CLIENT		JOB #		
SAMPLER		DATE		
SITE ADDRESS		P.M.		
FIELD COUNT: AUGER FLIGHTS				

MATERIAL	DESCRIPTION	FIELD COUNT	TOTAL	SUPPLIED BY M/H OR SUB?
Bentonite Chips	50 lb. bag			
Enviroplug Grout	50 lb. bag			
Volclay Grout	_____ lb. bag			
Redi-Mix Concrete	_____ lb. bag			
Portland Cement	_____ lb. bag			
Asphalt Patch	_____ lb. bag			
Bentonite Pellets	____ lb. bucket			
Filter Pack Sand	# _____			
PVC - blank Schedule 40	Diam.: Lengths:			
PVC - screen Schedule 40	Diam.: Lengths:			
PVC - Caps/Plugs/ Couplings	Diam.: Threaded ?			
Monitor Well Box/Locking Cap	Bolt Size:			
Locks	Master # _____ #			
Brass Sample Tubes/Caps				
Glassware: VOAs 1 lt amber jars				
Bailers	Poly Disposable Teflon Disposable			

*For Drums see Drum Inventory Form

_____ Ticket Number

DigAlert Checklist
800-227-2600

_____ Expiration Date

Client_____

Job #_____

WATERSTONE ENVIRONMENTAL, INC.

_____ Street Address

_____ City

_____ Nearest Cross Street

_____ Thomas Guide Page

_____ Who are you doing the work for?

_____ What are you doing? (soil borings excvation, etc.)

_____ Are the boring locations marked? (make certain they are)

_____ When do you intend to start? (no sooner than 48 hours after this call)

List the utility companies that will be called by DigAlert:

MEETING TIME FOR UTILITY COMPANIES

APPENDIX D

PROJECT REQUIRED DETECTION LIMITS AND BACKGROUND/ACTION LEVELS

TABLE D-1

METALS
DETECTION LIMITS AND BACKGROUND/ACTION LEVELS

Analyte	Water RDL (µg/L)	Background/ Action Level (µg/L)
Arsenic	10	30
Cadmium	5	TBD
Chromium	5	5
Cobalt	5	10
Copper	5	TBD
Lead	5	TBD
Nickel	5	50
Zinc	5	2,000

Notes:

µg/L Micrograms per liter
RDL Required detection limit
Background Action Levels: From Table 4-29 of the Final Remedial Investigation RI (for dissolved metals concentrations).
TBD To be determined-not evaluated in RI

TABLE D-2

INORGANIC
DETECTION LIMITS AND BACKGROUND/ACTION LEVELS

Analyte	Groundwater RDL (µg/L)	Background/ Action Level (µg/L)
Alkalinity	2000	TBD
Chloride	200	1000
Sulfate	500	TBD
Total Dissolved Solids	10000	TBD

Notes:

µg/L Micrograms per liter
RDL Required detection limit
TBD To be determined-not evaluated in RI

TABLE D-3

RADIOCHEMISTRY
DETECTION LIMITS AND BACKGROUND/ACTION LEVELS

Analyte	Groundwater RDL (pCi/L)	Background/ Action Level (µg/L)
Gross Alpha	2.0	TBD
Gross Beta	4.0	TBD
Radium 226	0.5	TBD
Radium 228	1.0	TBD
Total Uranium	1.0	TBD
Radon	0.5	TBD
Gamma Emitters (Cs 134)	1.0	TBD
Gamma Emitters (Cs 137)	1.0	TBD

Notes:

pCi/L Picocuries per liter
RDL Required detection limit
TBD To be determined-not evaluated in RI

APPENDIX E

APPROVED LABORATORIES

APPENDIX E

APPROVED LABORATORY

Fruit Growers Laboratory Environmental and Agricultural Chemists	
Contract Number:	00-141
Lab Address:	P.O. Box 272 853 Corporation Street Santa Paula, CA 93061-0272
Point of Contact:	Michael Franco
Phone:	805-659-0910
E-mail Address:	mfranco@fglinc.com
Capabilities:	Radionuclides in groundwater, SW-846, general parameters: FGL is a Lawrence Livermore/Berkeley Laboratory/D.O.E. approved radiological testing facility.
Navy Approved:	

APPENDIX F

NOVEMBER 15, 1999 WORKPLAN, PREPARED BY KENNEDY JENKS CONSULTANTS AND JANUARY 13, 2000 REVISION 1

WORK PLAN FOR SITE 22

BREITBURN ENERGY COMPANY

November 15, 1999

K/J 992306 00

Prepared for:

BREITBURN ENERGY COMPANY
3415 S Sepulveda Boulevard, Suite 130
Los Angeles, CA 90034

Prepared by:

KENNEDY/JENKS CONSULTANTS
2151 Michelson Drive, Suite 100
Irvine, CA 92612-1311

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1 INTRODUCTION

One of the sites under investigation at Naval Weapons Station (NWS) Seal Beach is leased by BreitBurn Energy Company, LLC (BEC). The site is designated Site 22 and is depicted in Figure 1. In an Interim Investigation Report for Site 22, dated 5 August 1998, it was recommended that additional studies be undertaken to determine whether the site poses any potential contamination to the NWS and the local environment.

This report contains a specific workplan to implement the additional studies recommended in the above-referenced report and requested by the SARWQCB in a letter dated 14 September 1999 The workplan contains the following tasks:

- Conduct additional groundwater sampling and analysis at the three onsite groundwater monitoring wells to confirm previous groundwater data
- Evaluate radiological data obtained from the additional groundwater sampling to determine whether the radiological contamination is from naturally occurring sources or man-made.
- Evaluate existing data to provide additional technical support to verify that there is no interconnection between the ponds, the drill site and adjacent wetland areas under tidal influence.

2 TASK 1 - GROUNDWATER SAMPLING ACTIVITIES

Three groundwater monitoring wells are installed at Site 22 (Figure 1). Four groundwater-sampling events have occurred, from July 1994 to May 1995. Another groundwater sampling event is to be taken as soon as the SARWQCB approves this work plan. The samples will be analyzed for the constituents (both unfiltered and filtered) as shown in Table 1. These constituents are the same as those previously analyzed except that lead has been added and cadmium has been removed as was mutually agreed between the Navy and BEC.

The groundwater samples will be collected following purging of the wells, which includes monitoring of field parameters (e.g., pH, conductivity, and temperature). Purging will be accomplished with a submersible pump or by manual bailing. Purge water will be placed in 55-gallon drums. Once the composition of the purge water is known, the purge water will be managed in an approved manner.

The groundwater samples will be collected in laboratory-provided sample bottles, labeled, and placed under chain-of-custody protocols and placed in an ice-filled cooler for transportation to a state-certified analytical laboratory. The current laboratory selected for the analytical work identified in Table 1 is Truesdail Laboratories, Inc. (a State Certified Laboratory). A duplicate field sample will be collected from Well 22M02 and an equipment rinsate blank sample will be collected for QA/QC purposes.

3 TASK 2 - RADIOLOGICAL ANALYSIS OF GROUNDWATER

Previous groundwater samples have been analyzed for gross alpha and gross beta analyses as part of the initial characterization of the radioactivity in the groundwater at Site 22. It is proposed to analyze the groundwater samples collected in the above task for the following parameters:

- Gross alpha/beta analysis by EPA method 900.0 or 00.02
- Radium-226 by EPA Method 903.1
- Radium-228 by EPA Method 904.0
- Total Uranium by EPA Method 908.0 or alpha spectroscopy
- Radon by SM 7500-Rn or equivalent (unfiltered samples only)
- Gamma emitters by EPA Method 901.1

Table 1 contains a listing of the various samples to be taken and the test methods to be used to perform these analyses. The groundwater samples will be analyzed both unfiltered and filtered (except as noted above). The purpose of the filtering is to determine whether the radioactivity is from the suspended solids or from dissolved constituents in the groundwater sample

The radiological analysis of the groundwater samples will be performed at a State Certified Laboratory. The currently selected lab is Thermo Nutech, a ThermoRetec Company located in Richmond, California.

Dr. Joe Drago will analyze the data to determine whether the radioactivity is from naturally occurring sources or from other man-made sources. Dr. Drago has worked on a number of projects involving naturally occurring sources and is quite familiar with these types of analyses. *(Note: Per the request of the Navy, Dr. Drago's resume is included at the end of this report.)*

4 TASK 3 - EVALUATION OF TIDAL INFLUENCE

The Interim Investigation Report concluded that a tidal influence study was not necessary because the ponds at Site 22 were dry in the summer, and the bottoms of the ponds are below high tide levels. This indicates that water levels in the ponds are not influenced by tidal action. The Navy requested that an evaluation of seepage and infiltration rates for water contained in the ponds be performed using available information.

The potential for water impounded in the lagoon to seep through the ponds and reach the groundwater will be estimated by employing factors including the depth of the impounded water, the thickness and hydraulic conductivity of the material underlying the pond, and the depth from the pond bottom to the surrounding groundwater. Existing survey data will be used to derive the depth of the pond. A range of values for the hydraulic conductivity and the thickness of the basal materials of the ponds will be used. Estimated seepage and infiltration rates will be compared to published information on evaporation rates for the location

5 FINAL REPORT

A report presenting the findings of this work will be prepared and submitted to the Navy, DTSC and the SARWQCB. The report will include data in tabular fashion so that comparisons can be made with previously obtained data. An evaluation of the radiological analyses will be included, as well as an evaluation of the surface impoundment impacts to the local environment.

TABLES

Table 1
Proposed Analyses
BreitBurn Energy Company, Site 22

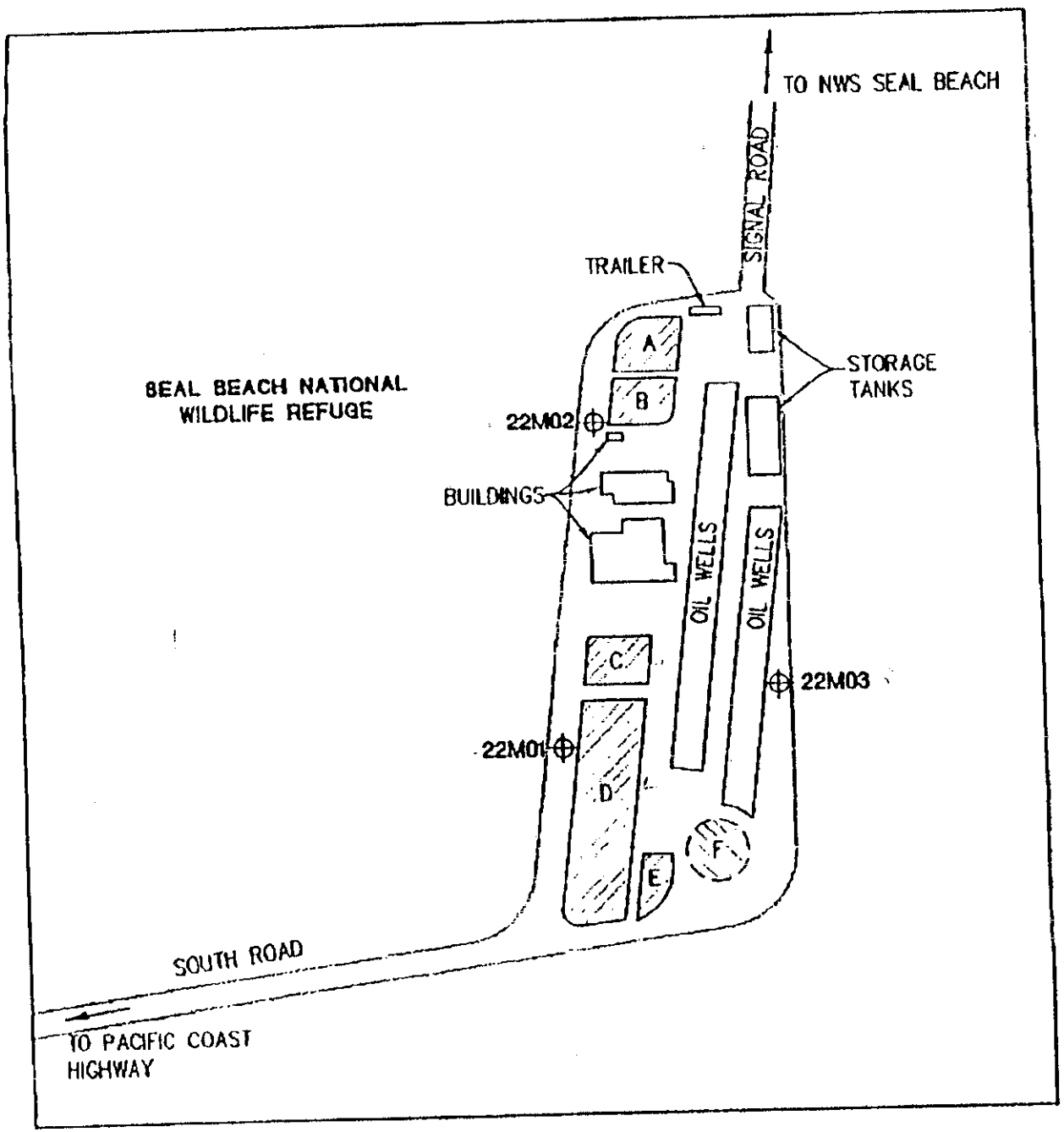
Analysis	Well 22M01 Unfiltered/Filtered	Well 22M02 Unfiltered/Filtered	Well 22M03 Unfiltered/Filtered	Equipment Rinsate Unfiltered/Filtered	TOTAL
RADIOACTIVITY					
Gross alpha/beta (EPA 900.0 or 0-02)	1/1	2/2	1/1	1/1	10
Radium-226 (EPA 903.1)	1/1	2/2	1/1	1/1	10
Radium-228 (EPA 904.0)	1/1	2/2	1/1	1/1	10
Total Uranium (EPA 908.0 or alpha spectroscopy)	1/1	2/2	1/1	1/1	10
Radon (SM 7500-Rn or eqivalent)	1/0	2/0	1/0	1/0	5
Gamma emmiters (EPA 901.1)	1/1	2/2	1/1	1/1	10
METALS					
EPA 6101[a]	1/1	2/2	1/1	1/0	9
Mercury (EPA 7470/7471)	1/1	2/2	1/1	1/0	9
GENERAL CHEMISTRY					
Alkalinity (EPA 403[b])	1/0	2/0	1/0	0	4
Chlorides (EPA 310.1/310.2)	1/0	2/0	1/0	0	4
PH (EPA 150.1)	1/0	2/0	1/0	0	4
Specific conductivity (EPA 120.1)	1/0	2/0	1/0	0	4
Sulfate (EPA 300.0)	1/0	2/0	1/0	0	4
Total Dissolved Solids (EPA 160.1)	0/1	0/2	0/1	0	4
TOTALS					

NOTES:

(a) EPA 6101 includes: aluminum, arsenic, barium, beryllium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, thallium, vanadium, zinc.

(b) Alkalinity includes biocarbonate alkalinity, carbonate alkalinity, and total alkalinity as carbonate.

FIGURES



N

0 100 200 400

Approximate Graphic Scale in Feet

LEGEND

22M01 GROUNDWATER MONITORING WELL

LAGOON (POND)

FILLED LAGOON

Kennedy/Jenks Consultants

Breit Burn Energy Company, LLC
NWS Seal Beach

Site 22

K/J 980001.00

Figure 1

APPENDIX G

COMMENTS PROVIDED BY REVIEWERS

Nancy Beresky

From: Ancog, Narciso A (EFDSW) [AncogNA@efdsw.navfac.navy.mil]
Sent: Thursday, July 11, 2002 3:52 PM
To: Nancy Beresky
Cc: Le, Si Tan (EFDSW); 'richamano@aol.com'
Subject: RE: Final QAPP

waterstone_SAP.pdf (107 KB)

Nancy:

The Sampling and Analysis Plan (SAP), BreitBurn Energy Company - Oil Island, Seal Beach, CA has been approved. Please see attachment for the signed approval page. I will keep the hard copy that I received from you dated July 10, 2002 for my file.

If it is necessary to revise the document due to regulatory comments, please note that I need to review and approve the revised version before it is sent to the regulatory agency again. I am requesting that you provide me with a copy of the responses to regulatory comments (if any) before you revise the document.

Regards,
Nars

-----Original Message-----
From: Nancy Beresky [mailto:nberesky@waterstone-env.com]
Sent: Wednesday, July 10, 2002 12:43 PM
To: Ancog, Narciso A (EFDSW)
Subject: RE: Final QAPP

OK Nars,
Thanks for the info!! I will follow your suggestions.

Thank you,

Nancy A. Beresky
Principal Hydrogeologist
Waterstone Environmental, Inc.
Cell Phone: 714-310-4188

Orange County Office:
2936 East Coronado Street
Anaheim, CA 92806
Phone: 714-414-1122
Fax: 714-414-1166

Long Beach Office:
1310 East Ocean Boulevard, Suite 701
Long Beach, CA 90802
Phone: 562-437-5277
Fax: 562-437-5319

-----Original Message-----
From: Ancog, Narciso A (EFDSW) [mailto:AncogNA@efdsw.navfac.navy.mil]
Sent: Wednesday, July 10, 2002 11:30 AM
To: Nancy Beresky; Ancog, Narciso A (EFDSW)

Nancy Beresky

From: Ancog, Narciso A (EFDSW) [AncogNA@efdsw.navfac.navy.mil]
Sent: Monday, June 24, 2002 3:44 PM
To: 'RichAmano@aol.com'; Ancog, Narciso A (EFDSW)
Cc: Nancy Beresky; Le, Si Tan (EFDSW)
Subject: RE: Responses to comments Oil Island, Seal Beach

Rich:

Responses to comments are acceptable. Please provide me with the revised version of the document for approval. In addition, please provide me with an unbound signed (by Waterstone personnel)copy of the approval page.

Regards,
Nars

-----Original Message-----
From: RichAmano@aol.com [mailto:RichAmano@aol.com]
Sent: Monday, June 24, 2002 1:30 PM
To: ancogna@efdsw.navfac.navy.mil
Cc: nberesky@waterstone-env.com
Subject: Responses to comments Oil Island, Seal Beach

Nars,

Enclosed are the responses to your verbal comments given to me last week. At

your convenience, please review and comment.

See you on Thursday at the DQC meeting

Thanks,

Rich

Richard Amano
President/Principal Chemist
Laboratory Data Consultants, Inc
7750 El Camino Real, Suite 2L
Carlsbad, CA 92009

(760) 634-0437
(760) 634-1674 (direct fax)
(760) 634-0439 (gen fax)

Nancy Beresky

From: RichAmano@aol.com
Sent: Monday, June 24, 2002 1:30 PM
To: ancogna@efdsw.navfac.navy.mil
Cc: Nancy Beresky
Subject: Responses to comments Oil Island, Seal Beach

RESPONSE_SITE22
_SAP.doc (36 KB

Nars,

Enclosed are the responses to your verbal comments given to me last week. At your convenience, please review and comment.

See you on Thursday at the DQC meeting.

Thanks,

Rich

Richard Amano
President/Principal Chemist
Laboratory Data Consultants, Inc.
7750 El Camino Real, Suite 2L
Carlsbad, CA 92009

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(760) 634-1674 (direct fax)
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Response to Site 22 Oil Island SAP

Item	Comment	Response
1	Change the document title to "Draft Sampling and Analysis Plan" (Field Sampling Plan/Quality Assurance Project Plan)	The title of the document will be changed as requested.
2	In Table 2, the regulatory review date states "concurrent with Navy review". This is not correct.	The table will be change to reflect actual dates.
3	In Table 3, Step 2: Identify the Decisions and Step 5: Develop Decision Rules should match up one for one	The table will be modified to reflect the direct correlation of the identification and development of decisions on a one to one basis.
4	In Table 3, Step 2: Identify the Decisions, bullet 4, the statement "communication with surrounding tidally influenced surface water" is unclear.	The statement will be clarified to described the concern with the contact between the lagoons and surface water.
5	In Table 3, Step 6, the section omits that statistical sampling is not used but judgmental sampling will be performed.	A bullet will be added to state that statistical sampling is not being used and judgmental sampling will be used.
6	Table 8, the metals holding time for mercury should be 28 days.	A line item for mercury will be added to reflect the 28 day holding time.
7	In Section 2.4.1 and 2.4.1.2, the references to the "Laboratory Analytical Statement of Work" does not appear to be applicable to the manner in which Waterstone conducts projects with the laboratory.	The sections will be modified to reflect the actual process Waterstone uses in managing and contracting laboratory services.
8	In Section 2.4.1.1 and 3.1.2, the document states the use of NFESC lab evaluations which is not applicable to this project	The reference to NFESC will be removed from these sections.
9	In Section 2.5, Quality Control, the field QC indicators are inter-mixed with the laboratory QC indicators. The field indicators should include field	The sections will be separated as requested into field and laboratory QC samples. The matrix spike, Section 2.5.1.2, will be moved under the

	duplicates, field blanks, and equipment rinsates. The lab indicators should include matrix spikes, laboratory control samples, and method blanks.	laboratory QC sample section.
10	In Table 5, Field QC Samples, the frequencies were stated per event. The frequency should be stated per number of samples.	The frequency will be changed to reflect one QC sample per 10 samples for each of the indicators.

DEPARTMENT OF THE NAVY
SOUTHWEST DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
1220 PACIFIC HIGHWAY
SAN DIEGO, CA 92132-5190

5090
SER 5NEN.SL/565
03 JUL 01

Mr. Patrick L. Gorski
Breitburn Energy Company
515 South Flower Street
Suite 4800
Los Angeles, CA 90071

Dear Mr. Gorski:

SUBJECT: REVIEW OF DRAFT-FIELD SAMPLING PLAN AND QUALITY ASSURANCE PROJECT PLAN FOR WATER SAMPLING AT SITE 22, OIL ISLAND

The Naval Facilities Engineering Command, Southwest Division (SWDIV), has reviewed subject plans dated April 11, 2001, prepared by Waterstone Environmental, Inc., for Breitburn Energy Company. We are enclosing QA/QC Officer and Remedial Technical Manager comments in enclosures (1) through (3).

If you need additional information or wish to discuss the comments, please contact Si Le at (619) 532-1235.

Sincerely,

M. R. GOOD
By direction of the Commander

Enclosures: 1. Document Review Evaluation Form for Draft FSP and QAPP, 24 Apr 01.
2. Document Review Evaluation Form for QAPP, 24 Apr 01.
3. E-mail from Christopher J. Leadon sent April 16, 2001

Copy to:
Pei-Fen Tamashiro
Naval Weapons Station, Seal Beach
800 Seal Beach Boulevard, B-110
Seal Beach, CA 90740-5000

Document Review Evaluation Form

Date: 24 APR 01
QAO: Nars Ancog
Contractor: Waterstone Environmental, Inc

Contract # : ?
CTO/DO: ?
RPM: Si Le

Document Title: Draft Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP) for Water Sampling, Site 22 Oil Island, Naval Weapons Station, Seal Beach, CA

CONTENT		DOCUMENT		QUALITY			
				ORIGINAL		REVISED	
Adequate	(X)*	Complete	(X)*	Excel.	( )	Excel.	( )
Inadequate	( )	Incomplete	( )	Good	( )	Good	( )
				Fair	(X)*	Fair	( )
				Poor	( )	Poor	( )

* - These "ratings" do not constitute document approval. Approval is contingent upon adequate revision of the document based on the comments provided below.

REFERENCE DOCUMENTS:

1. Navy IR Chemical Data Quality Manual, NFESC, September 1999
2. Guidance for the Data Quality Objectives, EPA QA/G-4, Final
3. EPA Requirements for QAPP for Environmental Data Operations, EPA QA/R-5, August 1999
4. U.S. EPA Guidance for Data Quality Assessment QA/G9, July 1996
5. U.S. EPA Guidance for Field Sampling Plan Preparation, August 1993
6. SWDIV Environmental Work Instruction #1 – Chemical Data Validation, Oct. 1999
7. SWDIV Environmental Work Instruction #2 – Review, Approval, Revision, and Amendment of Field Sampling Plans (FSP) and Quality Assurance Project Plans (QAPP), Oct. 1999
8. SWDIV Environmental Work Instruction #3 – Laboratory Quality Assurance Program, Oct., 1999

Comments:

1. The "required" signature blocks in the approval page include the contractor Project Manager, the contractor Quality Assurance Officer (QAO), and the SWDIV QAO. Please delete other signature blocks and revise the approval page accordingly.
2. Section 2.2.1.2, Sample Collection – Specify where the samples will be collected and the number of samples to be collected per sampling location. In addition, specify what analyses will be performed. Cross-reference other sections if necessary.
3. Section 2.2.1.4, Sample Containers and Sample Preservation – Sample containers and preservation for general chemistry parameters should also be specified in this section. Cross-reference Table 4.0 of the QAPP.
4. Section 2.2.3, Sample Documentation – Include a description of the field logbook.

ENCL (1)

5. Section 2.2.3.2, Sample Chain-of-Custody – Due to the nature of this project, the chain-of-custody records should contain all the necessary information. At the minimum, the following information should be included: Project name and number, Name and signature of sampler, Destination of samples (laboratory name), Sample identification number, Date and time of collection, Number and type of containers filled, Analysis requested, Preservatives used, Filtering (if applicable), Sample designation, (grab or composite), Signatures of individuals involved in custody transfer (including date and time of transfer), Temperature of "cooler" when received by laboratory, etc.
6. Incorporate comments. Provide responses to comments along with the revised version of the document prior to regulatory review and field implementation.

Nars Ancog
U. S. Navy Quality Assurance Officer

Copy to:

Code 03EN2

Document Review Evaluation Form

Date: 24 APR 01
QAO: Nars Ancog
Contractor: Waterstone Environmental, Inc.

Contract # : ?
CTO/DO: ?
RPM: Si Le

Document Title: Quality Assurance Project Plan (QAPP) for Water Sampling, Site 22 Oil Island, Naval Weapons Station, Seal Beach, CA

CONTENT		DOCUMENT		QUALITY			
				ORIGINAL		REVISED	
Adequate	( )	Complete	( )	Excel.	( )	Excel.	( )
Inadequate	(X)*	Incomplete	(X)*	Good	( )	Good	( )
				Fair	( )	Fair	( )
				Poor	(X)*	Poor	( )

* - These "ratings" do not constitute document approval. Approval is contingent upon adequate revision of the document based on the comments provided below.

REFERENCE DOCUMENTS:

1. Navy IR Chemical Data Quality Manual, NFESC, September 1999
2. Guidance for the Data Quality Objectives, EPA QA/G-4, Final
3. EPA Requirements for QAPP for Environmental Data Operations, EPA QA/R-5, August 1999
4. U.S. EPA Guidance for Data Quality Assessment QA/G9, July 1996
5. U.S. EPA Guidance for Field Sampling Plan Preparation, August 1993
6. SWDIV Environmental Work Instruction #1 – Chemical Data Validation, Oct. 1999
7. SWDIV Environmental Work Instruction #2 – Review, Approval, Revision, and Amendment of Field Sampling Plans (FSP) and Quality Assurance Project Plans (QAPP), Oct. 1999
8. SWDIV Environmental Work Instruction #3 -- Laboratory Quality Assurance Program, Oct., 1999

Comments:

1. See comment #1, FSP.
2. Table of Contents – Most of the subsections in section 4.0 are not related to Sample Containers, Volumes, and Preservation. Revise the Table of Contents to reflect the true content of the document.
3. Section 1.2, Special Training Requirements and Certifications – Specify that the laboratory must be CERTIFIED by the state of California Environmental Laboratory Accreditation Program (ELAP) on analytical methods required for this project. If subcontracting is necessary, the subcontractor must have the required certification for the method. Revise accordingly.

ENCL. (2)

4. Section 2.1, Data Quality Objectives (DQO) – This section is grossly inadequate. It is not clear what the decision questions are and how these decisions will be made (decision rule, step 5). In addition, other DQO steps are inadequately addressed. Please refer to reference document #2 and revise this section accordingly.
5. Page 9, Labeling, Packaging, and Shipment – At a minimum, sample labels should contain the following information: Project name, Sample identification number, Date and time of sample collection, Preservative used (if any), Sample collectors initials, Filtering (if applicable), Composite or grab, Analysis required. Revise accordingly.
6. Section 4.8, Data Validation and Usability – Data validation should be performed by an independent group. Additionally, 10% of the data should be fully validated (EPA Level IV) and 90% cursory (EPA Level III). Please see attached (ewi#1) description of pertinent data validation requirements.
7. Create a table listing all the metals. In this table, specify the reporting limit and project threshold for each metal. If the reporting limit is greater than the project threshold, explain how "compliance" will be dealt with. Footnotes are acceptable.
8. Address other required QAPP elements as described in reference document #3 and in the SWDIV QAO original comments (appendix B).
9. Incorporate comments. Provide responses to comments along with the revised version of the document prior to field implementation.

Nars Ancog
U. S. Navy Quality Assurance Officer

Copy to:

Code 03EN2

RESPONSE TO COMMENTS
QUALITY ASSURANCE PROJECT PLAN (QAPP) FOR WATER SAMPLING
(DATED APRIL 11, 2001)

SITE 22 OIL ISLAND
NAVAL WEAPONS STATION
SEAL BEACH, SEAL BEACH, CA

Comments by:	Nars Ancog, U.S. Navy Quality Assurance Officer
Comments Dated:	April 24, 2001
Response by:	Nancy Beresky, Principal Hydrogeologist, Waterstone Environmental, Inc.
Response Dated:	February 28, 2002

Note: As per our conference call in February 2002, Waterstone has teamed with Laboratory Data Consultants of Carlsbad, CA to assist in the preparation of a revised QAPP. At that time, Waterstone agreed that the Response to Comments made by the Navy was to be submitted prior to the submittal of the revised draft QAPP. The revised draft QAPP will be submitted at the end of March, 2002. After the QAPP is approved, a revised draft Field Sampling Plan (FSP) will be submitted.

Number	Comment	Response
1.	FSP: The "required" signature blocks in the approval page include the contractor Project Manager, the contractor Quality Assurance Officer (QAO), and the SWDIV QAO. Please delete other signature blocks and revise the approval page accordingly.	The approval page has been revised as requested. A revised draft QAPP will be submitted under separate cover. After the QAPP is approved, a revised draft Field Sampling Plan wll be submitted.
2.	FSP: Section 2.2.1.2, Sample Collection - Specify where the samples will be collected and the number of samples to be collected per sampling location. In addition, specify what analyses will be performed. Cross-reference other sections if necessary.	The section has been revised as requested. A revised draft QAPP will be submitted under separate cover. After the QAPP is approved, a revised draft Field Sampling Plan wll be submitted.
3.	FSP: Section 2.2.1.4, Sample Containers and Sample Preservation - Sample containers and preservation for general chemistry parameters should also be specified in this section. Cross-reference Table 4.0 of the QAPP.	The section has been revised as requested. A revised draft QAPP will be submitted under separate cover. After the QAPP is approved, a revised draft Field Sampling Plan wll be submitted.
4.	FSP: Section 2.2.3, Sample Documentation - Include a description of the field logbook.	The section has been revised as requested. A revised draft QAPP will be submitted under separate cover. After the QAPP is approved, a revised draft Field Sampling Plan wll be submitted.

RESPONSE TO COMMENTS
QUALITY ASSURANCE PROJECT PLAN (QAPP) FOR WATER SAMPLING
(DATED APRIL 11, 2001)

SITE 22 OIL ISLAND
NAVAL WEAPONS STATION
SEAL BEACH, SEAL BEACH, CA

Comments by:	Nars Ancog, U.S. Navy Quality Assurance Officer
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Number	Comment	Response
5.	FSP: Section 2.2.3.2, Sample Chain-of-Custody - Due to the nature of this project, the chain-of-custody records should contain all the necessary information. At the minimum, the following information should be included: Project name and number, Name and signature of sampler, Destination of samples (laboratory name), Sample identification number, Date and time of collection, Number and type of containers filled, Analysis requested, Preservatives used, Filtering (if applicable), Sample designation, (grab or composite), Signatures of individuals involved in custody transfer (including date and time of transfer), Temperature of "cooler" when received by laboratory, etc.	The section has been revised as requested. A revised draft QAPP will be submitted under separate cover. After the QAPP is approved, a revised draft Field Sampling Plan wll be submitted.
6.	FSP: Incorporate comments. Provide responses to comments along with the revised version of the document prior to regulatory review and field implementation.	All comments and responses to comments will be incorporated into the final FSP as an Appendix. A revised draft QAPP will be submitted under separate cover. After the QAPP is approved, a revised draft FSP will be submitted. All comments and responses to comments made at the time of the revised FSP submittal will be provided in the revised FSP.
1.	QAPP: See Comment #1, FSP	The approval page has been revised as requested. A revised draft QAPP will be submitted under separate cover. After the QAPP is approved, a revised draft Field Sampling Plan wll be submitted.

RESPONSE TO COMMENTS
QUALITY ASSURANCE PROJECT PLAN (QAPP) FOR WATER SAMPLING
(DATED APRIL 11, 2001)

SITE 22 OIL ISLAND

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Number	Comment	Response
2.	QAPP: Table of Contents - Most of the subsections in section 4.0 are not related to Sample Containers, Volumes, and Preservation. Revise the Table of Contents to reflect the true content of the document.	The QAPP Table of Contents will be revised as requested. A revised draft QAPP will be submitted under separate cover. After the QAPP is approved, a revised draft Field Sampling Plan will be submitted.
3.	QAPP: Section 1.2, Special Training Requirements and Certifications - Specify that the laboratory must be CERTIFIED by the state of California Environmental Laboratory Accreditation Program (ELAP) on analytical methods required for this project. If subcontracting is necessary, the subcontractor must have the required certification for the method. Revise accordingly.	The section will be revised as requested. A revised draft QAPP will be submitted under separate cover. After the QAPP is approved, a revised draft Field Sampling Plan will be submitted.
4.	QAPP: Section 2.1, Data Quality Objectives (DQO) - This section is grossly inadequate. It is not clear what the decision questions are and how these decisions will be made (decision rule, step 5). In addition, other DQO steps are inadequately addressed. Please refer to reference document #2 and revise this section accordingly.	The section will be revised as requested. A revised draft QAPP will be submitted under separate cover. After the QAPP is approved, a revised draft Field Sampling Plan will be submitted.
5.	QAPP: Page 9, Labeling, Packaging, and Shipment - At a minimum, sample labels should contain the following information: Project name, Sample identification number, Date and time of sampling collection, Preservative used (if any), Sample collectors initials, Filtering (if applicable), Composite or grab, Analysis required. Revise accordingly.	The section will be revised as requested. A revised draft QAPP will be submitted under separate cover. After the QAPP is approved, a revised draft Field Sampling Plan will be submitted.

RESPONSE TO COMMENTS
QUALITY ASSURANCE PROJECT PLAN (QAPP) FOR WATER SAMPLING
(DATED APRIL 11, 2001)

SITE 22 OIL ISLAND

NAVAL WEAPONS STATION

SEAL BEACH, SEAL BEACH, CA

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Number	Comment	Response
6.	QAPP: Section 4.8, Data Validation and Usability - Data validation should be performed by an independent group. Additionally, 10% of the data should be fully validated (EPA Level IV) and 90% cursory (EPA Level III). Please see attached (ewi#1) description of pertinent data validation requirements.	The section will be revised as requested. A revised draft QAPP will be submitted under separate cover. After the QAPP is approved, a revised draft Field Sampling Plan will be submitted. Data validation is to be performed by Laboratory Data Consultants of Carlsbad, CA, an independent group.
7.	QAPP: Create a table listing all the metals. In this table, specify the reporting limit and project threshold for each metal. If the reporting limit is greater than the project threshold, explain how "compliance" will be dealt with. Footnotes are acceptable.	In Appendix D, Table D-1 of the revised draft QAPP provides the requested information. The revised draft QAPP will be submitted under separate cover. After the QAPP is approved, a revised draft Field Sampling Plan will be submitted.
8.	QAPP: Address other required QAPP elements as described I reference document #3 and in the SWDIV QAO original comments (appendix B).	The requested QAPP elements have been addressed. A revised draft QAPP will be submitted under separate cover. After the QAPP is approved, a revised draft Field Sampling Plan will be submitted.
9.	QAPP: Incorporate comments. Provide responses to comments along with the revised version of the document prior to field implementation	All comments and responses to comments will be incorporated into the final QAPP as Appendix G. A revised draft QAPP will be submitted under separate cover. After the QAPP is approved, a revised draft FSP will be submitted. All comments and responses to comments made at the time of the revised QAPP submittal will be provided in the revised QAPP.

Appendix D

WATERSTONE ENVIRONMENTAL, INC., STANDARD PROTOCOL FOR COLLECTION OF SOIL SAMPLES USING A HAND AUGER

A 5-foot-long stainless steel hand auger, fitted with 5-foot long conduit extension(s) as needed, is used to drill an approximately 2- 1/4 inch-diameter boring to the proposed depth. Each soil sample is collected by hand driving a solid or split-spoon sampler lined with a 6-inch brass tube into the undisturbed soil at each sampling depth. The sample tubes are removed from the sample and trimmed of excess soil. The end of the sample tube is covered with squares of Teflon sheeting, plastic end caps, and waterproof , labeled, and placed inside a ziplock bag. A sample label is attached to each tube identifying the date the sample was collected, a unique identification number, and other identifying information

Soil samples are placed in a thermally insulated container with ice and shipped or couriered to a State-certified hazardous waste-testing laboratory (or delivered immediately to an on-site mobile laboratory) using the appropriate chain-of-custody procedures

Prior to and between the sampling intervals, all reusable equipment is decontaminated by washing in a non-phosphate detergent (Alconox) solution The equipment is then rinsed in tap water, and then rinsed in distilled water.

WATERSTONE ENVIRONMENTAL, INC.,
STANDARD PROTOCOL

Collection of Soil Samples Using A Strataprobe

Undisturbed soil samples are collected using a split spoon drive sampler. The soil sampling device is deployed, by a Strataprobe rig. The Strataprobe is a rig with a hydraulic system that is used to push hollow steel rods with a sampling device at the end of the rods through the subsurface. The Strataprobe rig pushes the sampling device to the targeted depth for sample retrieval.

Once the sampling probe is pushed to the desired depth, internal rods are placed inside the hollow push rods and are connected to the retractable tip of the sampling probe. The tip is then retracted and the split spoon sampling probe is advanced another foot so soil can enter the sampling device. The sampling device is lined with three 6-inch long and 1 25-inch diameter steel tube. Upon retrieval of the soil sampling device, the brass tube at the lower end of the sampler is covered with Teflon tape and plastic end caps, labeled identifying the date the sample is collected and an identification designation, and placed in a cooler to be shipped to a certified analytical laboratory.

The material in the remaining brass tubes were placed in a ziplock bag to conduct headspace testing on the material after sufficient volatilization had occurred (approximately 5 minutes) The probe of a Organic Vapor Monitor (OVM) photoionization detector (PID) calibrated to isobutylene is placed inside the bag to monitor for volatile organic vapors. Following headspace measurements the sample is visually inspected by the site hydrogeologist and classified using the Unified Soil Classification System. The soil is inspected for color, texture, grain size distribution, moisture content, odor, and any other distinguishing characteristics. Lithologic data, PID readings and other pertinent data are recorded on a boring log.

Prior to sampling, all reusable sampling equipment is decontaminated by washing in a solution of non-phosphate soap and water. The equipment is then double rinsed in distilled water. The sample push rods are steam cleaned on-site between each sample location. The rinsate water is placed in Department of Transportation approved 55-gallon drums and centralized to an on-site location.

All soil sample locations are backfilled with bentonite chips and hydrated and then capped with asphalt patch or concrete to grade.